

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN ~~118440~~

Proj. ECN W-016-66

2. ECN Category (mark one) Supplemental <input type="checkbox"/> Direct Revision <input checked="" type="checkbox"/> Change ECN <input type="checkbox"/> Temporary <input type="checkbox"/> Supersedure <input type="checkbox"/> Discovery <input type="checkbox"/> Cancel/Void <input type="checkbox"/>	3. Originator's Name, Organization, MSIN, and Telephone No. W. A. Holstein E6-50 6-6809		4. Date 7/8/91
	5. Project Title/No./Work Order No. RMW Storage Facility CR9265	6. Bldg./Sys./Fac. No. 2403 WB, WC, WD	7. Impact Level 3 /SC3
	8. Document Number Affected (include rev. and sheet no.) W-016H-C3 Rev. 1	9. Related ECN No(s). N/A	10. Related PO No. N/A
11a. Modification Work <input type="checkbox"/> Yes (fill out Blk. 11b) <input type="checkbox"/> No (NA Blks. 11b, 11c, 11d) Unknown	11b. Work Package Doc. No. Unknown	11c. Complete Installation Work <hr style="width: 100%;"/> Cog. Engineer Signature & Date	11d. Complete Restoration (Temp. ECN only) <hr style="width: 100%;"/> Cog. Engineer Signature & Date

12. Description of Change

1. General Revision. See Attached Rev. 2.



13a. Justification (mark one) Criteria Change <input type="checkbox"/> Design Improvement <input type="checkbox"/> Environmental <input type="checkbox"/> As-Found <input type="checkbox"/> Facilitate Const. <input type="checkbox"/> Const. Error/Omission <input type="checkbox"/> Design Error/Omission <input checked="" type="checkbox"/>	13b. Justification Details Revision 1 was issued per procedure CP-12, As-Building. This did not have the same review cycle as required by Procedure ES-6.
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14. Distribution (include name, MSIN, and no. of copies) <table style="width: 100%;"> <tr> <td style="width: 30%;">KEH DIST</td> <td style="width: 30%;"></td> <td style="width: 30%;">WHC DIST</td> <td style="width: 10%;"></td> </tr> <tr> <td>HE WELLSFRY</td> <td>G6-47 (WHC)</td> <td>PROJECT FILES</td> <td>R1-28</td> </tr> <tr> <td>CONST DOC CNTL</td> <td>E2-50</td> <td>NF BARILO</td> <td>R3-54</td> </tr> <tr> <td></td> <td></td> <td>JK EPPERLY</td> <td>S0-05</td> </tr> <tr> <td></td> <td></td> <td>JR McGEE</td> <td>G6-47</td> </tr> <tr> <td></td> <td></td> <td>PJ McKENNA</td> <td>R3-54</td> </tr> <tr> <td></td> <td></td> <td>HE WELLSFRY (PE)</td> <td>G6-47</td> </tr> <tr> <td></td> <td></td> <td>TL YOUNT</td> <td>G6-47</td> </tr> <tr> <td></td> <td></td> <td>STA 10</td> <td>A3-87</td> </tr> <tr> <td></td> <td></td> <td>DOF</td> <td></td> </tr> </table>	KEH DIST		WHC DIST		HE WELLSFRY	G6-47 (WHC)	PROJECT FILES	R1-28	CONST DOC CNTL	E2-50	NF BARILO	R3-54			JK EPPERLY	S0-05			JR McGEE	G6-47			PJ McKENNA	R3-54			HE WELLSFRY (PE)	G6-47			TL YOUNT	G6-47			STA 10	A3-87			DOF		<p style="text-align: center;">RELEASE STAMP</p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> OFFICIAL RELEASE 23 BY WHC DATE JUL 10 1991 Sta # 10 </div>
KEH DIST		WHC DIST																																							
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		DOF																																							

MS COLLINS

A5-18

ENGINEERING CHANGE NOTICE

15. Design Verification Required

Yes

No

16. Cost Impact

<p style="text-align: center;">ENGINEERING</p> <p>Additional <input checked="" type="checkbox"/> \$ <u>100</u></p> <p>Savings <input type="checkbox"/> \$ _____</p>	<p style="text-align: center;">CONSTRUCTION</p> <p>Additional <input checked="" type="checkbox"/> \$ <u>0</u></p> <p>Savings <input type="checkbox"/> \$ _____</p>
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17. Schedule Impact (days)

Improvement 0

Delay _____

18. Change Impact Review: indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

<input type="checkbox"/> SDD/DD	<input type="checkbox"/> Seismic/Stress Analysis	<input type="checkbox"/> Tank Calibration Manual
<input type="checkbox"/> Functional Design Criteria	<input type="checkbox"/> Stress/Design Report	<input type="checkbox"/> Health Physics Procedure
<input type="checkbox"/> Operating Specification	<input type="checkbox"/> Interface Control Drawing	<input type="checkbox"/> Spares Multiple Unit Listing
<input type="checkbox"/> Criticality Specification	<input type="checkbox"/> Calibration Procedure	<input type="checkbox"/> Test Procedures/Specification
<input type="checkbox"/> Conceptual Design Report	<input type="checkbox"/> Installation Procedure	<input type="checkbox"/> Component Index
<input type="checkbox"/> Equipment Spec.	<input type="checkbox"/> Maintenance Procedure	<input type="checkbox"/> ASME Coded Item
<input type="checkbox"/> Const. Spec.	<input type="checkbox"/> Engineering Procedure	<input type="checkbox"/> Human Factor Consideration
<input type="checkbox"/> Procurement Spec.	<input type="checkbox"/> Operating Instruction	<input type="checkbox"/> Computer Software
<input type="checkbox"/> Vendor Information	<input type="checkbox"/> Operating Procedure	<input type="checkbox"/> Electric Circuit Schedule
<input type="checkbox"/> OM Manual	<input type="checkbox"/> Operational Safety Requirement	<input type="checkbox"/> ICRS Procedure
<input type="checkbox"/> FSAR/SAR	<input type="checkbox"/> IEPD Drawing	<input type="checkbox"/> Process Control Manual/Plan
<input type="checkbox"/> Safety Equipment List	<input type="checkbox"/> Cell Arrangement Drawing	<input type="checkbox"/> Process Flow Chart
<input type="checkbox"/> Radiation Work Permit	<input type="checkbox"/> Essential Material Specification	<input type="checkbox"/> Purchase Requisition
<input type="checkbox"/> Environmental Impact Statement	<input type="checkbox"/> Fac. Proc. Samp. Schedule	_____
<input type="checkbox"/> Environmental Report	<input type="checkbox"/> Inspection Plan	_____
<input type="checkbox"/> Environmental Permit	<input type="checkbox"/> Inventory Adjustment Request	_____

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number/Revision
_____	_____	_____
_____	_____	_____
_____	_____	_____

20. Approvals

Signature	Date	Signature	Date
<u>OPERATIONS AND ENGINEERING</u>		<u>ARCHITECT-ENGINEER</u>	
Cog./Project Engineer <u>W. E. Walleby</u>	<u>7-10-91</u>	PE <u>William J. Matt</u>	<u>7-9-91</u>
Cog./Project Engr. Mgr. <u>T. L. Grant</u>	<u>7-10-91</u>	QA <u>Tommy Saberry</u>	<u>7-9-91</u>
QA <u>J. W. Schultz for J. R. Mc GEE</u>	<u>7-10-91</u>	Safety <u>D. Lundgren</u>	<u>7-8-91</u>
Safety _____	_____	Design <u>Adhangerwin</u>	<u>7-8-91</u>
Security _____	_____	Other <u>NA</u>	_____
Proj. Prog./Dept. Mgr. _____	_____	Environmental <u>J. F. Mudge</u>	<u>7-8-91</u>
Def. React. Div. _____	_____	Specification <u>M. A. Fisher</u>	<u>7-8-91</u>
Chem. Proc. Div. _____	_____	_____	_____
Def. Wst. Mgmt. Div. _____	_____	<u>DEPARTMENT OF ENERGY</u>	
Adv. React. Dev. Div. _____	_____	_____	_____
Proj. Dept. _____	_____	<u>ADDITIONAL</u>	
Environ. Div. _____	_____	_____	_____
IRM Dept. _____	_____	_____	_____
Facility Rep. (Ops) _____	_____	_____	_____
Other _____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

W-016H-C3
Revision 2

CONSTRUCTION SPECIFICATION FOR
RADIOACTIVE MIXED WASTE STORAGE FACILITIES

Work Order CR9265

Revision 0: 09-12-90
Revision 1: 05-30-91

OFFICIAL RELEASE **23**
BY WHC
DATE JUL 10 1991

Prepared By:

Kaiser Engineers Hanford Company
Richland, Washington

For the U.S. Department of Energy

Contract DE-AC06-87RL10900

Ann A. Langlois 7/8/91 M. A. Fisher 7/3/91
Principal Lead Engineer Date Technical Documents Date

E. Lundgren 7-9-91 J. F. Mudge 7/3/91
Safety Date Environmental Date

James Salisbury 7-9-91 William Matt 7-9-91
Quality Engineering Date Project Manager Date

Westinghouse Hanford Company

H. E. Wolfson 7-10-91
Projects Department Date

DOES NOT CONTAIN CLASSIFIED OR
UNCLASSIFIED CONTROLLED
NUCLEAR INFORMATION

J. F. Mudge
Reviewing Official/ADC
Kaiser Engineers Hanford Company
7/3/91
Date

RECORD OF REVISION

(1) Document Number

W016H-C3

Page 1

(2) Title

Construction Specification for Radioactive Mixed Waste Storage Facilities

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release		
		(5) Cog./Proj. Engr.	(6) Cog./Proj. Mgr.	Date
	(7) REV.0 - EDT-125914			
RS 1	Incorporates Project ECNs W-016-52, 54, 56, 57, 58 and 59 prior to bid. Project ECN W-016-56 adds 12" Sanitary Waterline specifications.	<i>d. S. Wellefry</i> 5-31-91	<i>T. Lyount</i> 5-31-91	
RS 2	Direct revision by ECN W-016-66.	<i>d. S. Wellefry</i> 7-10-91	<i>T. Lyount</i>	7-10-91



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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 INTRODUCTION

1.1.1 Project W-016H Radioactive Mixed Waste Storage Facility is located in the 200W Limited Access Area of the Hanford Site, approximately 25 road miles northwest of Richland, Washington.

1.2 STATEMENT OF WORK

1.2.1 Scope: The work consists of furnishing supervision, labor, equipment, materials, transportation, and services for procurement, receiving, handling, storage, protection, fabrication, installation inspection, and testing to provide (3) operational facilities ready for occupancy in accordance with these contract documents.

1.2.2 Work Included: Design fabrication and erection of 3 metal buildings. One of the buildings is 55,000 square feet, and other two are 34,000 square feet each. The work includes:

1.2.2.1 Survey, clear, and grub each building site.

1.2.2.2 Grade, gravel, and asphalt approaches to each building and access roadway between and around buildings.

1.2.2.3 Furnish and install underground water and electrical service to each building.

1.2.2.4 Furnish and install mechanical, electrical, fire alarm, fire protection, and air monitoring systems in each building.

1.2.2.5 Furnish and apply special protective coating to each building slab.

1.2.2.6 Furnish and install approximately 4,000 linear feet of underground 12 inch diameter sanitary water line.

1.3 DRAWINGS: The Drawings which show the work to be accomplished by these Contract Documents are listed on Drawing H-2-80894.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01019

ITEMS FURNISHED FOR CONSTRUCTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Code of Federal Regulations (CFR)

Title 30 Mineral Resources

Sub Chapter N - Metal and Nonmetal Mine Safety and Health

30 CFR 56

Safety and Health Standards -
Surface Metal and Nonmetal
Mines

1.2 SUBMITTALS: Not Used

1.3 GENERAL

1.3.1 Material and equipment furnished or made available to be incorporated into the Work are set forth in this Section. Other services and utilities provided are covered in other sections of this Specification.

1.3.2 Comply with provisions of Section 9 of the Contract General Conditions for all items furnished for construction.

1.3.3 Provide KEH access to the premises where items furnished for construction are stored before incorporation into the Work.

1.4 GRAVEL AND SAND

1.4.1 Gravel and sand from unmined natural deposits are available at no cost from sites designated by KEH within 4 miles of the project site. KEH makes no representation that unmined materials will meet physical properties required in this Specification.

1.4.2 If the Contractor elects to utilize the available gravel sites, Contractor shall furnish all equipment and labor required to excavate, process, load, transport, and place the gravel and sand.

1.4.3 Material from the gravel sites shall be used only for the work covered by this Specification and no gravel or sand, processed or nonprocessed, or concrete manufactured therefrom shall be transported off the Hanford Site.

1.4.4 Access to gravel sites and travel between gravel sites and construction sites shall be on roads designated by KEH and the use shall be in compliance with the requirements of Section 01500 of this Specification.

1.4.5 Operations at the gravel sites shall be in compliance with the following requirements.

1.4.5.1 Confine removal of overburden and top soil to areas designated by KEH. Stabilize blow sand areas after surface has been disturbed with ballast or other approved method to prevent wind erosion.

1.4.5.2 Make no excavation or bank cut within 100 feet of power lines, paved roads, railroads, security fences, or other permanent structures.

1.4.5.3 Excavation and processing shall be in accordance with 30 CFR 56, Safety and Health Standards. Correct operations identified by KEH to be hazardous to life or property.

1.4.5.4 Explosives are prohibited articles as described in Section 56 of the Contract General Conditions and shall not be brought to the Hanford Site or proposed for use without written KEH approval.

1.4.5.5 Temporary structures are permitted at the gravel site for offices, storage, or repair facilities necessary for the gravel removal and processing operations. No facility for habitation shall be permitted.

1.4.5.6 Use of gravel sites shall be nonexclusive. Others may also enter the gravel sites to excavate material required for other work.

1.4.5.7 Upon completion of operations the gravel site shall be cleared of debris, temporary structures, and equipment. The excavated area shall be graded, banks properly sloped, and stabilized to prevent wind erosion. Conditions identified by KEH as not meeting these requirements shall be corrected before final acceptance of the Work.

1.4.5.8 The right to use the gravel sites may be terminated by KEH for failure to comply with requirements set forth herein or for abandonment of operations under this contract. The right to use the gravel sites shall terminate without notice upon acceptance of Work under this Contract.

1.5 MATERIALS AND EQUIPMENT

1.5.1 Other materials and equipment shown or specified in the Specifications and the Drawings required to complete the Work shall be furnished by the Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01027

APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FORMAT

1.3.1 Complete Form KEH-1026.00, Progress Estimate Backup, sample appended. Contractor developed substitutes for form may be used only with prior approval of KEH.

1.3.2 Complete Form KEH-0959.00, Monthly Estimate of Work Completed, sample appended, or include following in letter requesting payments.

Subtotal Value of All Pay Items Completed to date (Include all modifications)		\$X,XXX.XX
Allowance for Material Stored on Site		
Previous Net Allowance	\$X,XXX.XX	
Minus Materials Placed	X,XXX.XX	
Plus Materials Stored	<u>X,XXX.XX</u>	
Net Allowance		<u>X,XXX.XX</u>
Subtotal Value Completed to Date		
Less Previous Payments	X,XXX.XX	
Less Other Charges from KEH	<u>X,XXX.XX</u>	
Subtotal Deductions		<u>(X,XXX.XX)</u>
Total Payment Requested		<u>\$X,XXX.XX</u>
Less Retainage @ _____%		<u>(X,XXX.XX)</u>
Total Payment Allowed		\$X,XXX.XX

1.4 APPLICATION PROCEDURE

1.4.1 Payments to Contractor set forth in Section 15 of Contract General Conditions are initiated by Contractor making application for payment as follows.

1.4.1.1 Begin application for payment by completing KEH furnished Form referenced in Paragraph 1.3.1. Include, as minimum, breakdown of contract price for each item listed in Section 01310 and percent complete for each item.

1.4.1.2 Review backup sheets with KEH and adjust data.

1.4.1.3 Finalize application for payment by either completing Form KEH-0959.00 or initiating letter containing elements of Paragraph 1.3.2.

1.5 PAYMENT PROCEDURE

1.5.1 Upon receipt of application for payment, KEH will audit data and check for compliance with requirements of Section 01720. When satisfied that contract requirements are up-to-date, Form KEH-0959.00 will be prepared and signed by KEH.

1.5.2 Copy of signed Form showing amount of payment to be made will be furnished Contractor.

1.5.3 KEH will mail check to Contractor's designated address.

1.6 ADDITIONAL DATA REQUIRED

1.6.1 When processing applications for payment and preparing payment documents, KEH may require data to substantiate and justify amounts requested. Processing of payment documents may be delayed if data is not forwarded expeditiously to KEH.

1.6.2 Requests for payment for equipment or material which Contractor has received, but has not installed, shall be accompanied by invoice or other data to provide evidence that title to equipment or material is held by Contractor.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

KAISER ENGINEERS HANFORD		MONTHLY ESTIMATE OF WORK COMPLETED	
Contractor P.O. No.		Estimate No.	Date
Name of Contractor			
Address			
Nature of Work			
Initial Amount of Contract \$	Total Amount of Modifications to Date \$	Total Adjusted Contract Amount \$	
Description		Amount	
Estimated Work Completed to (Date)			
Less:	\$		
Previous Payments	\$		
Other Charges (Explain Below)	\$		
Total Deductions		(\$)
Adjusted Payment Requested		\$	
Less Retainage @ _____%		\$	
Total Payment Allowed		\$	
SAMPLE			
<p>I certify that I have verified this periodical estimate dated _____ for \$ _____ and that to the best of my knowledge and belief it is a true and correct statement of work performed and that the contractor's statement of his account and amount due him is correct and just, and the quantities included in this estimate have been performed in full accordance with the terms and conditions of the corresponding construction documents.</p>			
FOR THE CONTRACTOR		KAISER ENGINEERS HANFORD COMPANY	
By _____		By _____	
		Project Manager	
By _____		By _____	
		Field Contract Engineer	

KEH-0959.00 (02/90)

END OF SECTION

SECTION 01040

COORDINATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 CONSTRUCTION ACTIVITIES

1.3.1 Coordinate construction activities to assure efficient and orderly sequence of work, with provisions for accommodating items to be installed later.

1.3.2 As noted in Section 29 of the Contract General Conditions, other contracts may be under construction concurrently with the work included in this Specification. The Contractor shall coordinate his activities with those of other contractors for the mutual benefit of all. Coordination meetings may be required in addition to progress meetings to keep all parties informed of scheduled activities at interface points.

1.4 WORK IN EXISTING FACILITIES

1.4.1 Buildings No. 2402 WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, and 2403WA are operating facilities and work must be planned and scheduled to minimize interference with plant operations and to sustain the safety of operating personnel.

1.4.2 Access to the work area shall be only as directed by KEH to minimize disruptions to work force.

1.4.3 Keep work area safe and orderly for construction personnel and operating personnel. Clean work area after each work period and stack tools and materials away from traffic areas.

1.5 CONNECTIONS TO EXISTING SYSTEMS

1.5.1 Forty-eight hour notice of work that will affect existing systems shall be given to KEH. Careful planning and scheduling of work activities is required to coordinate operations of existing systems to keep disruptions at a minimum.

1.5.2 As required in Subsection 50.7 of Contract General Conditions, the connection to the existing systems must be scheduled 2 weeks in advance for work to be done. KEH will coordinate the schedule with the Contractor and utility.

1.5.3 The connection must be accomplished within 24 hours.

1.6 ACCESS TO WORK AFTER POSSESSION

1.6.1 Access to warranty work as set forth in Section 24 of Contract General Conditions or access to work after possession as set forth in

Section 20 of Contract General Conditions will be coordinated by KEH with other contractors, and users of the facility. Notify KEH in advance of proposed work to minimize disruptions.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01043

JOB SITE ADMINISTRATION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 WORKING HOURS

1.3.1 Work shall be performed during regular day shift which is 7:30 a.m. to 4:00 p.m., Monday through Friday, excluding holidays.

1.3.2 Work other than regular day shift requires KEH approval in advance as set forth in Section 51 of Contract General Conditions.

1.4 BADGE, DOSIMETER, AND ORIENTATION

1.4.1 The Work is within a Limited Access Area. Badging, basic dosimeter requirements, and orientation will be in accordance with Section 56 of Contract General Conditions.

1.5 EVACUATION DRILLS

1.5.1 Personnel working inside Limited Access Area are required to participate in emergency evacuation drills which are held approximately once every 3 months and last approximately 1 hour.

1.5.2 Maintain daily log or other suitable record of names of all personnel including subcontractors working inside the Limited Access Area.

1.6 SECURITY

1.6.1 Policy and Procedures: Contractor employees are required to comply with security policy and procedures set forth in Sections 56 and 87 of Contract General Conditions. Copies of Safeguards and Security Manual KEH-MA-6 will be provided to the Contractor upon request after award of Contract.

1.6.2 Security Escorts

1.6.2.1 Contractor personnel not having "5" or "3" security clearance, working within 200 West Limited Area require security escorts. Escorts are provided by KEH at no cost except as set forth in subparagraph 1.6.2.8.

1.6.2.2 Escorts will be assigned from the KEH trailer located outside the 200 East Limited Area near Access Gate 814.

1.6.2.3 The ratio of escorts to uncleared Contractor personnel for the purpose of daily transportation of men and materials to the worksite shall be 1 to 5, irrespective of the type of craft or lower tier companies the 5 personnel represent. For days when the Contractor's total work force is less than 5 people, a maximum of 1 escort will be provided.

1.6.2.4 The ratio of escorts to uncleared personnel at the worksite through the course of a workday shall be the same as set forth in subparagraph 1.6.2.3.

1.6.2.5 Contractor shall provide "pooled" transportation for his uncleared personnel and the KEH escorts into the limited/protected work areas. A maximum of 3 Contractor vehicles for uncleared personnel will be allowed into the limited/protected area at any time. No personal vehicles will be allowed into the limited area under this contract.

1.6.2.6 Parking for personnel and Contractor vehicles not used due to "pooling" of personnel to the worksite shall be available at the escort trailer near 200 East Area Gate 814.

1.6.2.7 Provide a list of Contractor personnel and vehicles to be used inside the limited/protected area and anticipated start and duration of the utilization. Provide the list 1 week before the start of work for escort requirement determination. Provide weekly work schedules of employees, not later than Thursday of the preceding week (minimum 24 hour notice required for changes).

1.6.2.8 The Contractor may be charged when escorts have been requested and the Contractor personnel do not show up at the time and place specified. Charges will be made at the rate of \$18 per hour for each escort for time lost waiting for Contractor personnel.

1.6.3 Security Clearances

1.6.3.1 Security clearances for Contractor employees may be provided for this Work and reduce the requirements for security escorts during construction. Requests for "5" clearance will be considered under the following circumstances.

1.6.3.2 Contractor has a contract with KEH for work within a Limited Area and has a minimum of 60 calendar days of onsite work remaining when request for clearance is received.

1.6.3.3 Clearances requested are for full-time employees, including crafts, expected to be employed for duration of Contract.

1.6.3.4 A personnel security questionnaire (PSQ) shall be completed for each person requesting clearance immediately after Contract award or as soon as onsite personnel requirements are known. Personnel security questionnaire forms available upon request.

1.6.3.5 Employees that received security clearances are required to sign a Security Termination Form, furnished by KEH, and return the form with the security badge when their Work is completed or the Contract terminated.

1.7 WORK NEAR ELECTRICAL LINES

1.7.1 In addition to requirements of Subsection 50.2 of Contract General Conditions, when cranes or hoists are operated under or adjacent to existing overhead electrical lines, a standby lineman must be in attendance.

Notify KEH not less than 3 working days before standby lineman is required. The standby lineman will be furnished by KEH at no cost.

1.8 SAFETY REQUIREMENTS

1.8.1 Fire Safety

1.8.1.1 The Contractor is required to address fire safety as part of his construction safety plan as required by Section 55 of Contract General Conditions. The following fire safety requirements are to be incorporated into the construction safety plan.

a. Portable shields shall be utilized wherever the Contractor is welding, cutting, or grinding.

b. Maintain a fire watch a minimum of 1/2 hour after the cessation of welding, cutting, or grinding.

c. Fully charged fire extinguishers shall be available whenever welding, cutting, or grinding.

d. Method to control the ignition of brush fires.

e. Method to comply with requirements for off road driving and grass fire prevention given in Section 01500.

1.8.2 Safety Apparel

1.8.2.1 Personnel shall wear appropriate foot wear in a recognized construction area. Tennis shoes, canvas type shoes, or open toe shoes do not meet this requirement.

1.8.2.2 Personnel, including nonconstruction, shall wear approved eye protection and construction type hardhats when in construction area.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01050

SURVEY AND FIELD ENGINEERING

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 QUALITY CONTROL

1.3.1 Establishing alignment, support location, and grades shall be the responsibility of a Land Surveyor registered in the State of Washington and acceptable to KEH.

1.3.2 Field notes, records, and documentation shall be available to KEH to review and verify the procedures used and the accuracy of work.

1.4 SURVEY DATA

1.4.1 Basic reference points with coordinate descriptions and bench mark with elevation identified will be located in the field by KEH Representative. Detail surveys shall be by Contractor.

1.4.2 Contractor shall be responsible for the preservation of bench marks and reference points, including stakes or other markers established until removal is authorized by KEH.

1.4.3 From information and dimensions indicated on the construction Drawings, Contractor shall perform survey/layout as required by the Work.

1.5 PROCEDURES

1.5.1 Before initial layout field verify horizontal and vertical data. Report discrepancies to KEH before proceeding.

1.5.2 Establish an adequate number of permanent reference points to be used during construction referenced to original control points. Record locations with horizontal and vertical data on Project Record Documents.

1.5.3 Protect and preserve control points and reference points until work is complete. Report to KEH the loss or destruction of any control point. Report the relocation or change in data affecting the reference points.

1.5.4 Periodically, verify data for each control point, reference point, and construction staking to maintain construction accuracy.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01065

PERMITS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 FEDERAL, STATE, AND MUNICIPAL LAWS, CODES, AND REGULATIONS

1.3.1 Permits or licenses to do business as required by Federal, State, and Municipal laws, codes, and regulations are the sole responsibility of the Contractor as stated in Section 6 of Contract General Conditions.

1.4 HANFORD SITE PERMITS

1.4.1 General: Before certain types of work can be done at Hanford, the Contractor is required to have a permit. These permits are provided by KEH at no cost to the Contractor; however, the Contractor must furnish information required and must notify KEH in advance of work for which permit is required. The Contractor shall comply with requirements and restrictions set forth in each permit.

1.4.2 Excavation: As set forth in Subsection 50.9 of Contract General Conditions no excavation shall be done without an Excavation Permit. Permit will be issued before start of construction and is for duration of the Work. Post permit at site of Work. In addition to the requirements on the KEH excavation permit, the contractor is required to have GTE locate any buried telephone lines prior to excavation. Telephone 1-800-424-5555.

1.4.3 Backfill Permit: Permit required for each element of fill and backfill and good for 5 days or duration of work element provided Work does not stop for 5 consecutive days. Permit form furnished by KEH shall be completed by Contractor and returned to KEH for approval before starting work. Permit shall be kept at worksite.

1.4.4 Tie-in Permit: A separate permit is required for each utility tie-in and is valid until tie-in is completed. Permits furnished by KEH with 5 days notice. Permit shall be kept at site of Work being performed.

1.4.5 Welding and Cutting Permit: All welding and flame cutting requires welding and cutting permit. Provide welding process to be used 5 days before start of welding for KEH to furnish permit. Permit shall be kept at worksite.

1.4.6 Oversize Load Permit: In addition to Washington State Permit, a site permit is required for each movement of oversize load or vehicle on established roads at Hanford Site. Permit will be furnished by KEH with 48 hour notice of the width, height and length of the oversized load and the proposed route of travel. The Contractor will be requested to verify the

proposed route has been travelled and all limitations (especially, wire or signal height) have been identified. See Section 01500 for vehicles requiring Oversize Load Permit, restrictions on movement, and other requirements.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Hazardous Materials

1.2.1.1 Provide a listing of all hazardous materials prior to using the material at the job site.

1.2.1.2 Provide a material safety data sheet (MSDS) for each material listed.

1.2.1.3 Provide method for storage of materials.

1.2.1.4 Provide method for interim storage of waste.

1.2.2 Fall Protection: Provide a written fall protection plan to be used during building erection, siding, and roof sheeting. The plan must reflect the most current changes in the WISHA fall protection standard. The plan must be site and task specific and include a minimum of the following:

1.2.2.1 Identification of the hazards.

1.2.2.2 Fall protection methods.

1.2.2.3 Procedures for assembly, maintenance, inspection, and disassembly of fall protection equipment.

1.2.2.4 Procedures for handling, storage, and securing of tools and work materials.

1.2.2.5 Methods of providing overhead protection for workers in the area below.

1.2.2.6 Methods of rescuing injured workers at high elevation.

1.2.2.7 Method for training workers and documenting training relative to this hazard.

1.3 HAZARDOUS MATERIAL REQUIREMENTS

1.3.1 Definitions

1.3.1.1 Hazardous material: A material or substance which is determined to be physically or chemically deleterious to the health or well being of an individual because of its toxic, reactive, flammable, or carcinogenic nature. For the most part, a list of these materials may be found in 29 CFR 1910, Subpart Z, and the latest edition of the ACGIH Threshold Limit Values booklet.

1.3.1.2 Hazardous material storage area: A place of accumulation of hazardous materials, in quantities greater than a 1 day supply.

1.3.2 Hazardous materials, whether specified, recommended, or voluntarily requisitioned by the Contractor, shall be governed by the requirements of FED-STD-313 and Section 111 of Contract General Conditions.

1.3.3 Hazardous Waste Handling

1.3.3.1 All hazardous waste materials generated by the Contractor at the job site shall be turned over to KEH for disposal.

1.3.3.2 Contractor personnel who handle, transfer, store or otherwise work with dangerous waste must be trained as required in WAC 173-303-330.

1.3.3.3 Hazardous waste spills must be reported to KEH immediately.

1.3.3.4 After identification of hazardous waste to be generated, a satellite accumulation area will be designated for the Contractor to deposit the waste.

1.3.3.5 Hazardous waste materials must be identified and packaged as approved or directed by KEH.

1.4 Breathing Air Requirements

1.4.1 Breathing air shall be of compressed G-7.1 Type 1 Grade E quality.

1.4.2 Supply systems, including compressors, shall be in accordance with WAC 296-62-07111.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 MEETING PROCEDURES

1.3.1 Representatives from KEH and the Contractor, including major subcontractors, shall participate in all project meetings. Representatives from Operating Contractor and DOE may attend as required by items to be discussed.

1.3.2 Meeting times and locations shall be mutually agreed to by Contractor and KEH and will be held at the Hanford Site in Richland, Washington, except informal design reviews. KEH will issue notices of meetings and prepare meeting minutes which will be distributed to project participants.

1.4 SITE LABOR CONFERENCE

1.4.1 Before starting construction onsite, Contractor and subcontractors shall attend an informational conference on Hanford Site labor requirements applicable to this project. Contractor shall schedule the conference with KEH and identify all crafts for this project. KEH will provide meeting notice to representatives from labor organizations whose members may be utilized in construction and will attend the conference. Contractor shall conduct the meeting and present the proposed work plan and craft utilization. Contract General Conditions relating to labor will be reviewed.

1.5 PRECONSTRUCTION MEETING

1.5.1 Meeting will be scheduled by KEH before start of onsite work. Authorized representatives of Contractor and major subcontractors shall attend and KEH will advise others having an interest in the Work. Meeting will be chaired by KEH.

1.5.2 Following items, as a minimum, will be incorporated into agenda for meeting.

1.5.2.1 Point of contact and key personnel representing Operating Contractor, Safety, QA/QC, Acceptance Inspectors, and Contract Administrators.

1.5.2.2 Schedule requirements and restraints, submittals and work limitations.

1.5.2.3 Safety, construction progress meetings and frequency, and certified payrolls.

1.5.2.4 Report requirements and frequency.

1.5.2.5 Quality requirements.

1.5.2.6 Major material and equipment lists.

1.5.2.7 Other pertinent items.

1.6 CONSTRUCTION PROGRESS MEETINGS

1.6.1 Meetings are held weekly at time and location determined at preconstruction meeting and will be approximately 1 hour long.

1.6.2 KEH will chair the meeting and request attendance of key personnel as required. Authorized representative of Contractor and pertinent subcontractors shall attend.

1.6.3 Purpose of meetings is to monitor status and provide forum for exchange of pertinent information related to the Work. Major topics may include, but not be limited to, the following.

1.6.3.1 Schedule, cost, and construction status.

1.6.3.2 Design and scope changes.

1.6.3.3 Submittal status, key material and equipment delivery status.

1.6.3.4 Potential problem areas.

1.6.3.5 Inspection and testing status.

1.6.3.6 Action item status, goals for next meeting.

1.6.3.7 Other appropriate items.

1.6.4 Meeting minutes will be issued by KEH as promptly as possible following the meeting. Action items will be identified with assigned follow-up. Issues resolved will be reported in the minutes, as well as closed action items.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.1 DESCRIPTION

1.1.1 This Section summarizes submittals required in Part 1 of each section of this Specification. It explains type of submittals required, and describes procedures for submittals and review.

1.1.2 Submittals required in Part 1 of each section are summarized in Article 1.3. Each submittal is identified by Submittal Number, Reference Section, and Title. Submittals are required for either "Review and Approval" or "Review for Record".

1.1.2.1 Submittals requiring review and approval are to receive approval before procurement, fabrication, or construction is started.

1.1.2.2 Submittals requiring review for record are those on which procurement, fabrication, construction or acceptance testing may proceed, but acceptance is contingent upon compliance with Drawings and Specifications.

1.1.3 Supplemental Submittals are initiated by Contractor in accordance with Section 01630 for consideration of substitute products or corrective procedures and require review and approval.

1.2 SUBMITTAL PROCEDURES

1.2.1 Transmit submittals to KEH by Data Transmittal form.

1.2.2 Identify each submittal by Submittal Number, Reference Section, and Title noted in Article 1.3. Number of copies required for retention by KEH are shown in Schedule and include 2 copies to be returned to Contractor. Additional copies required for Contractor uses shall be added.

1.2.3 Review each submittal for completeness, compliance with Contract Documents, and for proper identification before sending to KEH. Submittal data shall either be stamped showing review process has taken place or Data Transmittal form may be signed with statement of "Reviewed for Compliance." Submittals not stamped or signed to show review will be returned without consideration.

1.2.4 Submittals requiring review and approval will be stamped by KEH and marked "Approved", "Approved with Exception" or "Not Approved, Revise and Resubmit." Approval of submittals does not relieve Contractor of responsibility for errors contained therein.

1.2.4.1 Approved submittals are identified by submittal stamp with "Approved" or "Approved with Exception" box checked. "Approved" signifies general concurrence to achieve conformance with design concept of Project and compliance with requirements of Contract Documents. "Approved with Exception" signifies general concurrence with noteworthy comments or

clarifications. Approval of specific item shall not be construed as approval of system or assembly of which item is a component.

1.2.4.2 A submittal which is not approved is identified as "Not Approved, Revise and Resubmit." Submittal is considered by KEH to be technically deficient or incomplete and therefore, unacceptable. Resubmittal is required, hence fabrication, procurement, or performance of procedures shall not proceed.

1.2.4.3 Upon receipt of deficient submittal data, make corrections noted on transmittal and resubmit data to KEH within 10 calendar days.

1.2.5 Materials and equipment fabricated or installed without required approved submittals, or which differ from approved Drawings or vendor data are subject to rejection and replacement at Contractor's expense.

1.2.6 Delays arising from failure to submit, in timely manner, required Drawings, and other related data described in Contract Documents, shall not constitute excusable delays for extensions, unless excusable under other provisions of Contract. Allow 15 calendar days for KEH review and disposition of submittals, including shop drawings and vendor information, required to be furnished. Time period will be measured from date of receipt of submittal in KEH's office to date of return mailing.

1.2.7 Contractor is responsible for dimensions to be confirmed and correlated at Project site.

1.2.8 Submittals for review and record will be reviewed and filed. Incomplete or inaccurate data will be returned marked "Resubmit" with appropriate comments, and items procured or work performed shall be corrected. Payment for equipment will not be made unless required Vendor Information has been furnished.

1.2.9 Supplemental submittals shall contain sufficient data required in Section 01630 to show substantial compliance with Drawings and Specifications. Substitute product submittals shall contain as minimum, outline dimensions, operating clearances, and engineering data. Identify each submittal by Specification Section number and Paragraph number or referenced Drawing number and detail. Improperly identified or incomplete submittals will be returned without consideration.

1.2.10 Procedures for performing certain items of work are required to be submitted for review and approval before work is commenced. Those work procedures which have been approved by KEH for work similar to that to be accomplished on Project may not need to be reapproved. Forward 1 copy of previously approved procedure to KEH by Data Transmittal form and identify by Submittal Number, Reference Section, Title, and either procedure number or project number for which procedure was approved. Submittal will be reviewed by KEH and if acceptable retained for record. If previously approved procedure is not acceptable submittal will be returned with requirements for resubmittal.

SCHEDULE OF SUBMITTALS

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
CONTRACT GENERAL CONDITIONS				
55.2	Safety Program and Job Safety Analysis	5	5 days before start of work	
55.3	Industrial Injury/Illness Experience	5		5 days before start of work and each month
55.5.1	OSHA Form No. 200 Report	5		5th working day, each month
55.6	Equipment Certification	5		2 days before bringing equipment onsite
SPECIAL PROJECT PROCEDURES				
01100/1.2.1.1	Hazardous Materials List	5		Prior to delivery
01100/1.2.1.2	MSDS	5		Prior to delivery
01100/1.2.1.3	Method of Storage	5		Prior to delivery
01100/1.2.1.4	Method of Waste Storage	5		Prior to delivery
PROGRESS SCHEDULES				
01310/1.3.1.1	Progress Schedule for First 60 Days	5	10 days after notice of award	
01310/1.3.1.1	Progress Schedule for Duration of Contract	5	30 days after notice of award	

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
PROGRESS SCHEDULES (Continued)				
01310/1.4	CPM Project Schedule	5	30 days after notice of award	
01310/1.5.1	Initial Bi-Weekly Work Schedule	2	10 days after notice of award	
01310/1.5.1	Subsequent Bi-Weekly Work Schedules	2	By noon each Friday	
EARTHWORK				
02200/1.2.1	Method to Prevent Damage During Excavation	5	Before excavation	
HOT-LAID ASPHALTIC CONCRETE PAVING				
02512/1.2.1	Laboratory Reports	5	Before delivery	
PIPED UTILITIES				
02650/1.2.1	Approval Data	5	Before delivery	
02650/1.2.2	Leak/Pressure Test Procedures	5	Before testing	
02650/1.2.3	NFPA Test Certificate	5	Within 10 days after completion	
FIRE WATER SYSTEMS				
02668/1.2.1	Approval Data	5	Before delivery	
02668/1.2.2	Vendor Information	12		Before installation
02668/1.2.3	NFPA Test Certificate	5	Within 10 days after completion	

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
CAST-IN-PLACE CONCRETE				
03300/1.2.1	Certification of Ready Mixed Concrete Production Facilities	5	Before mixing	
03300/1.2.2	Reinforcing Steel Fabricator Drawings	5	Before delivery	
03300/1.2.3	Block Diagram	5	Before installation of forms	
03300/1.2.4	Concrete Materials, Mix Design and Mix Proportions	5	Before mixing	
03300/1.2.5	Cold Weather Concreting	5	Before placing concrete	
03300/1.2.6	Curing Procedure	5	Before mixing	
METAL FABRICATIONS				
05500/1.2.1	Fabricator Drawings for Gratings	5	Before fabrication	
PREFORMED ROOFING AND CLADDING/SIDING				
07400/1.2.1	Fabricator Drawings	5	Before fabrication	
07400/1.2.2	Color Samples	3	Before fabrication	
FLASHING AND SHEET METAL				
07600/1.2.1	Fabricator Drawings	5	Before fabrication	
SEALANTS AND CALKING				
07920/1.2.1	Manufacturer's Installation Instructions	5	Before application	
METAL DOORS AND FRAMES				
08100/1.2.1	Fabricator Drawings	5	Before delivery	

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
OVERHEAD COILING DOORS				
08332/1.2.1	Fabricator Drawings	5	Before delivery	
FINISH HARDWARE				
08710/1.2.1	Hardware List	5	Concurrent with doors and frames	
SPECIAL PROTECTIVE COATING				
09805/1.2.1	Vendor Information	12		Before installation
09805/1.2.2	List of Materials	5	Before delivery	
09805/1.2.3	Certificate of Compatibility	5	Before delivery	
09805/1.2.4	Crew Certification	5	Before application	
09805/1.2.5	Application Instructions	5		Before application
PAINTING				
09900/1.2.1	List of Materials	5	Before delivery	
09900/1.2.2	Color Samples	3	Before delivery	
INTERIOR SIGNS				
10440/1.2.1	Manufacturer's Data	5	Before delivery	
PRE-ENGINEERED STRUCTURES				
13120/1.2.1	Erection Instructions and Diagrams	5	Before delivery	
13120/1.2.2	Certificates of Conformance or Compliance	5	Before delivery	
13120/1.2.3	Color Samples	1	Before delivery	

Submittal Number	Submittal Title	Quantity	Review and Approval	Review For Record
FIRE PROTECTION				
15300/1.2.1	Approval Data	5	Before delivery	
15300/1.2.2	Vendor Information	12		Before installation
15300/1.2.3	Design/Fabricator Drawings	5	Before fabrication	
15300/1.2.4	Seismic Calculations	5	Before fabrication	
15300/1.2.5	Record Drawings	5		Within 10 days after completion
15300/1.2.6	NFPA Test Certificate	5		Within 10 days after completion
HEATING, VENTILATING, AND AIR CONDITIONING				
15500/1.2.1	Approval Data	5	Before delivery	
15500/1.2.2	Vendor Information	12		Before installation
15500/1.2.3	Test Data	5		Within 10 days after test completion
SERVICE AND DISTRIBUTION				
16400/1.2.1	Approval Data	5	Before delivery	
ALARM AND DETECTION SYSTEMS				
16720/1.2.1	Approval Data	5	Before Delivery	
16720/1.2.2	Vendor Information	12		Before installation

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01310
PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Rate of Progress Schedule: Submit schedule as required in this Section.

1.2.2 CPM Project Schedule: Submit schedule as required in this Section.

1.3 RATE OF PROGRESS SCHEDULES

1.3.1 Progress schedules as identified in Section 5 of Contract General Conditions shall be submitted for approval, by phase, in accordance with the following.

1.3.1.1 Schedules shall be submitted after receipt of notice to proceed, for a contract phase, as follows:

a. A schedule covering the first 60 calendar days of Contract phase activities, within 10 calendar days.

b. A schedule covering all Contract activities for the duration of the phase, within 30 calendar days. Based on CPM Schedule required in Article 1.4.

1.3.1.2 The progress schedule shall show the order in which the Contractor proposes to carry on the work, the dates on which it will start the several salient features of the work including procurement of materials and equipment and contemplated dates for completion. Each schedule shall be in the form of a horizontal bar chart of suitable scale to indicate the percentage of work scheduled for completion at any time with a separate bar for each activity. At the end of each week or at the end of such other periods of time specified in the Contract, the Contractor shall prepare and submit 1 copy of such chart showing the actual progress at the end of such period.

1.3.2 Organize the schedule to show activities relative to each major subcontractor and supplier. Provide sub-schedule to define critical portions of the entire schedule.

1.3.3 The progress schedule shall include design activities and milestones, delivery date of design documents. Construction activities, progress milestones, and include but not be limited to the following activities.

1.3.3.1 Schedule of activities:

- a. Mobilization and bond.
- b. Clear and grub site.
- c. Install underground water service.
- d. Install underground electrical service.
- e. Perform building excavation.
- f. Form and pour foundation.
- g. Pour slab.
- h. Erect building.
- i. Install roll-up door.
- j. Install exhaust fans and louvers.
- k. Install sprinkler piping inside the building.
- l. Construct riser rooms.
- m. Install electrical ground grid.
- n. Install building electrical and fire alarm equipment.
- o. Perform electrical and fire alarm systems testing.
- p. Install CAM units.
- q. Test CAM units.
- r. Apply special protective coating.
- s. Stabilize around building.
- t. Gravel and pave roadways.
- u. Punchlist and demobilize.

1.3.4 The schedule shall show, as a minimum, the accumulated percentage of completion of each activity and total percentage of work completed as of the last work day of each month.

1.3.4.1 An "S" curve shall be developed from percentage of total work figures and superimposed on the Progress Schedule.

1.3.4.2 A dollar value or percent of total shall be shown next to each activity shown on the schedule. These figures will be the basis for determining the progress payments described in Section 01027.

1.4 CPM PROJECT SCHEDULE

1.4.1 Prepare and submit for approval within 30 calendar days a CPM Project Schedule identifying critical path activities which includes the logical sequence and relationship of activities for engineering, design, submittals, procurement, fabrication, delivery, erection, installation and testing of work covered by each Contract phase.

1.4.2 Activity durations shall be in working days. Activities exceeding 20 working days shall be reduced by identifying logical subactivities. Activity titles shall be self-explanatory with abbreviations shown in a legend on the document. Indicate early start, early finish, late start, late finish, (restraining activities) and total float for activities. Highlight critical path activities to identify the project's critical path.

1.4.3 The CPM Project Schedule shall include but not be limited to the following activities. Reference CPM Schedule: Appended is a reference CPM schedule. This schedule is included to aid the Contractor in developing the CPM required by Paragraph 1.4.

a. All significant engineering functions performed prior to fabrication, such as specific procedures, and shop and field drawings, submitted for approval and approved.

b. Major material acquisitions and delivery.

c. Offsite fabrication and delivery schedules.

d. All lower tier contractor activities.

e. All field installation and nondestructive examination activities.

f. Indications that work for each activity is to be performed on a single, double or triple shift, and that work is to be done on a 5, 6, or 7 day work week basis.

g. Identification of inspection (hold) points.

h. Manpower loading and leveling.

i. Milestones indicating interface requirements with construction activities performed by others.

1.5 BI-WEEKLY WORK SCHEDULE (Two Week Look Ahead)

1.5.1 The Contractor shall prepare and submit 2 copies of a detailed schedule of the next 2 week's work no later than noon of each Friday. The first work schedule shall be submitted within 10 working days after receipt of the written notice of Contract award for review and approval. The schedule shall include the following as a minimum.

a. Work description.

b. Location of work.

- c. Work involving outages, overtime, weekends, etc.
- d. Inspection requirements.

1.6 REVISIONS TO SCHEDULES

1.6.1 Whenever KEH determines that there is a significant variance between actual and scheduled progress, endangering completion within the Contract completion time, KEH may require that Contractor prepare and submit a revised CPM and progress schedule.

1.6.2 Indicate progress of each activity to date of submittal and projected completion date of each activity. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

1.6.3 Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect, including the effect of changes on schedules of separate contractors.

1.6.4 Distribute copies of revised schedules to jobsite file, subcontractors, suppliers, and other concerned entities. Instruct recipients to promptly report, in writing, problems anticipated by projections shown in revised schedules.

1.6.5 If the Contractor fails to submit the progress schedule specified in Paragraph 1.3.1 within the time prescribed, or the updated progress schedule specified in Paragraph 1.6.1, within the requested time, KEH may withhold approval of progress payments until such time as the Contractor submits the required progress schedules.

PART 2 - PRODUCTS

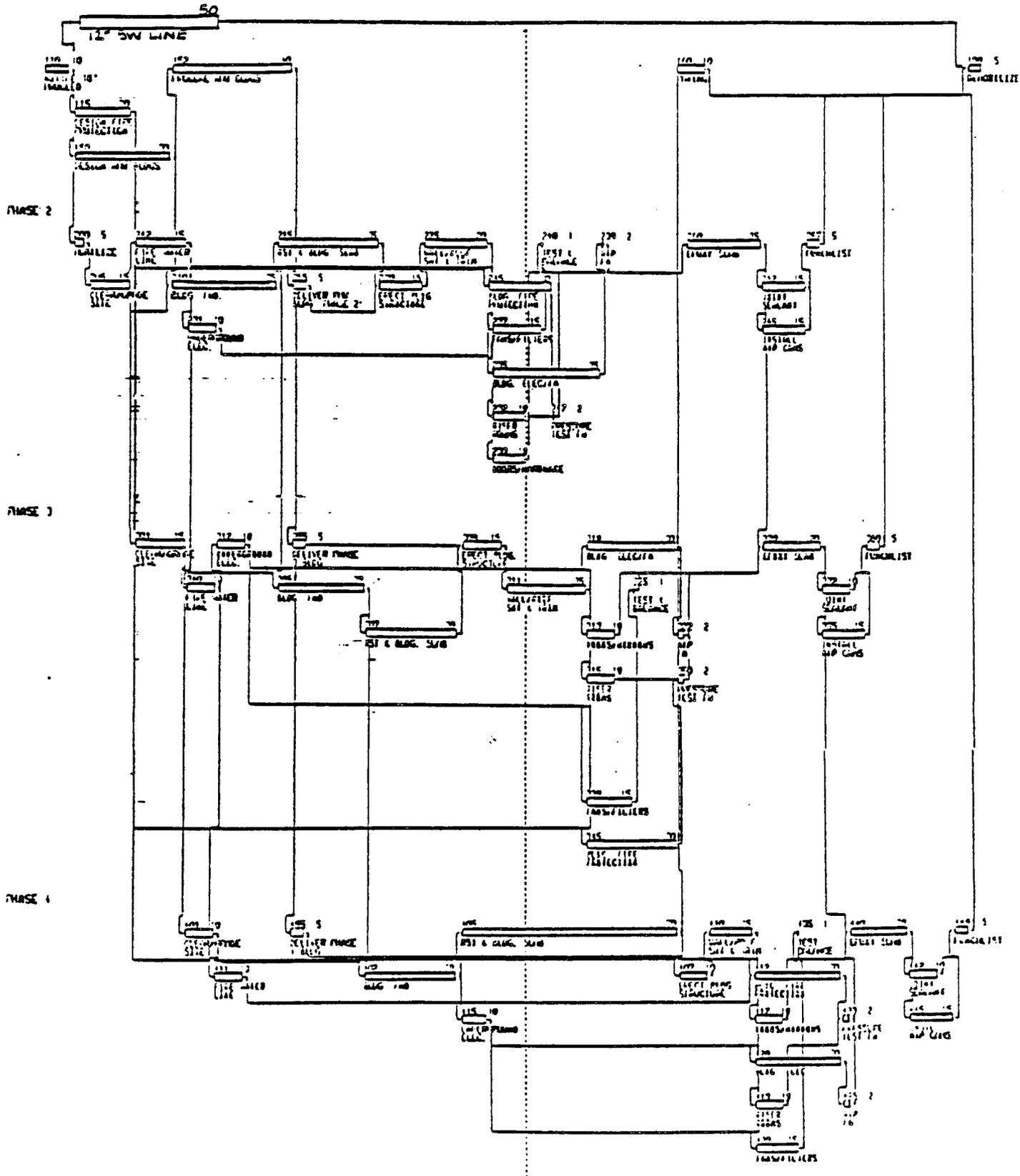
Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

APPENDIX A



SECTION 01400
QUALITY ASSURANCE

PART 1 - GENERAL

1.1 REFERENCES: Not Used.

1.2 SUBMITTALS: Not Used.

1.3 INSPECTING AND TESTING

1.3.1 In accordance with Section 19 of Contract General Conditions, perform following.

1.3.1.1 Section 02668, Leak Testing.

1.3.1.2 Section 05500, Visual Weld Examination.

1.3.1.3 Section 09805, Concrete Surface Inspection.

1.3.1.4 Section 09900, Surface Inspection.

1.3.1.5 Section 13120, inspect final installation of pre-engineered structures.

1.3.1.6 Section 15300, Leak Testing.

1.3.1.7 Section 15500, HVAC Testing.

1.3.1.8 Section 16400, Electrical Testing.

1.3.1.9 Section 16720, Electrical Testing.

1.3.1.10 Section 16720, Acceptance Test Procedure (ATP).

1.3.2 In accordance with Section 19 of Contract General Conditions, KEH will perform following.

1.3.2.1 Testing to determine moisture density relations and field in-place density of soils.

1.3.2.2 Sampling and testing of asphalt concrete pavement.

1.3.2.3 Preparation, collecting, and testing of concrete specimens.

1.3.2.4 Testing of special protective coating.

1.3.2.5 Dc testing of new cable at receipt.

1.3.2.6 Cable and transformer testing after installation.

1.3.2.7 Witness specific inspection and witness points.

1.3.2.8 Perform final acceptance inspection.

1.3.3 Specific Inspection and Witness Points

1.3.3.1 Adhere to inspection points required. Ensure personnel have completed inspections of and approved portions of work in accordance with Contract requirements before notifying KEH.

a. Specific inspection and witness points are defined as follows.

1) Construction inspection (H): Required for witnessing of specific construction features, before further construction is allowed to proceed.

2) Receiving (R): Special items of fabrication, equipment, or material scheduled to be delivered to Project site or other designated location which require inspection upon arrival. Notify KEH within 4 hours after arrival of item.

3) Witness (W): Selected for inspection at option of KEH. Work may proceed upon verbal release by KEH or upon expiration of 1 hour beyond scheduled time of witness.

b. H, R, and W points apply to onsite work. Except where longer period is specified, notify KEH at least 4 working hours before each point for onsite work.

1.3.3.2 H, R, and W points are for following items and stages of work.

SITework

Earthwork

H - All compaction procedure demonstration
H - All backfilling operations

Road Subgrade And Granular Base

H - All compaction procedure demonstration
H - All backfilling operations

Hot-Laid Asphaltic Concrete

H - All compaction procedure demonstration
H - All compaction testing of hot-laid asphaltic concrete pavement

Fire Water Systems

H - Initial flushing
H - All hydrostatic testing

CONCRETE

Cast-In-Place Concrete

- H - All concrete placement
- H - Initial grout placement

METALS

Metal Fabrications

- H - Initial welding

THERMAL AND MOISTURE PROTECTION

Sealants And Calking

- H - Initial application of sealants and calking on concrete floor

FINISHES

Special Protective Coating

- H - Prior to initial application

SPECIAL CONSTRUCTION

Pre-Engineered Structures

- H - Initial erection of pre-engineered structures

MECHANICAL

Fire Protection System

- H - All flushing of piping
- H - All pressure testing of piping

Heating, Ventilating, And Air Conditioning

- R - Arrival of wall exhauster
- H - All testing of HVAC system

ELECTRICAL

Service And Distribution (600-Volts And Below)

- H - Initial cable pull
- H - Initial exothermic welding

- H - All meggering of conductors rated 600 volts and used for services, feeders or branch circuits over 150 volts to ground, phase-to-phase, and phase-to-ground
- W - All remainder electrical testing
- H - Final closure of all electrical enclosures

Alarm And Detection Systems

- W - All continuity testing of fire alarm circuits
- H - All acceptance test procedures

1.4 OPEN ITEM DEFICIENCY AND NONCONFORMANCE REPORTING

1.4.1 KEH utilizes open item deficiencies and nonconformance reports to document deviations from Contract requirements.

1.4.1.1 Open item deficiency: Documented on open item lists available from KEH on request. Can be corrected by Contractor without additional direction. Correction shall bring item into compliance with Contract requirements, using approved rework procedures or standards without violating application specifications, codes, or standards.

1.4.1.2 Nonconformance report: Documented on nonconformance report (NCR). NCRs document deviations from Contract requirements when characteristic, documentation, or procedure renders quality of item or activity unacceptable or indeterminate. NCRs are identified by red construction hold tags or blue NCR tags. A hold tag prohibits movement, installation, processing or further fabrication of nonconforming items pending approval of NCR disposition. An NCR tag identifies nonconformance but allows work to proceed based on an approved NCR disposition. No action shall be taken to correct or alter actual condition before receipt of approved disposition. Tags are not to be removed by anyone other than agency who applied tag.

1.4.2 Contractor shall ensure its organization is represented by individuals with sufficient authority to commit Contractor to corrective action requirements identified by KEH.

1.4.3 Open item deficiencies and nonconformances reported during performance of Contract require resolution before completion and final payment.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 National Fire Protection Association (NFPA)

NFPA 701 Standard Methods of Fire Tests for Flame-Resistant Textiles and Films, 1989 Edition

1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88 Standard Specifications for Road, Bridge, and Municipal Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.3 CONSTRUCTION FACILITIES

1.3.1 First Aid: Facilities are available at Building 2719WA in the 200 West Area to provide first line medical attention.

1.3.2 Operation and Storage Areas: The onsite operations of the Contractor including storage of materials shall be confined to area adjacent to the worksite as designated in the field by KEH.

1.3.3 Disposal Site for Waste: Disposal of excess excavation, broken asphalt, and broken concrete shall be at a site approximately 12 road miles from the project location. The disposal site is open only during regular working hours as stated in these Contract Documents.

1.4 TEMPORARY UTILITIES

1.4.1 Water

1.4.1.1 Construction water

a. Water for construction purposes will be made available from a hydrant adjacent to the worksite. Hauling, dispensing, and temporary piping shall be at the Contractor's expense. Fittings furnished by the Contractor for connection to the water source must be approved by KEH before installation. The Contractor shall remove all temporary piping, hoses, fittings, and valves before final acceptance of the work.

b. Water will be made available from an existing hydrant in the vicinity of each worksite. A 4-1/2 inch, National Standard Thread, 1/4 turn ball valve with a female swivel to a 4-inch sexless "Snap-Tite/Storz" quick connect coupling shall be connected to the 4-1/2 inch port for Fire Department use only. A reduced pressure backflow preventer, BEECO-AERGAP

Model 6CM or approved, and a slow-opening 2-1/2 inch gate valve shall be installed on each hydrant port intended for construction use. A slow-opening valve will prevent water hammer. The hydrant wrench, backflow preventers and all valves shall be furnished by the Contractor. The wrench shall remain on the hydrant at all times. When used, the hydrant shall be turned "Full-on" or "Full-off". Partial opening causes damage to the hydrant. The hydrant shall be turned off at the end of each work day. The Contractor shall provide freeze protection for the hydrant and temporary piping or hoses. All temporary pipe or hose extensions shall be furnished by the Contractor. Fittings provided by the Contractor for connection to water source shall be approved by KEH prior to installation. Before final acceptance of the contract work, the Contractor shall remove all temporary piping, hoses and valves installed by him.

NOTE: Contractor is required to notify KEH prior to each opening of hydrant.

1.4.1.2 Drinking water: Water for drinking purposes will be made available within the 200 West Area. The Contractor is responsible for furnishing adequate drinking water to his employees that conforms to health and safety requirements.

1.4.2 Electrical Power: Temporary power 240-120V ac will be made available at a power pole near the site assigned for the field office. All power lines or cable extensions, including transformers, protective equipment, switches, and fixtures beyond the point of supply shall be furnished by the Contractor. All temporary installations made by the Contractor shall be removed upon completion of construction under this contract.

1.4.3 Telephone

1.4.3.1 The telephone system within the Administratively Controlled Area at the Hanford Site is operated by General Telephone Company of the Northwest, Inc. Upon request of the Contractor, KEH will arrange for telephone service at the construction offices of the Contractor and its subcontractors, if facilities for such services are available. KEH will charge the Contractor for installation and services in accordance with the charge assessed by General Telephone Company. Those charges will be determined on the basis of published tariffs. Information of tariffs may be obtained from DOE's Site Services Contractor, office of the Manager of the Plant Telephone and Radio, Telephone 376-6322.

1.4.3.2 All of the above charges will be deducted from payments due the Contractor. The Contractor and its subcontractors may use provided telephones for long distance calls necessary to the performance of the work. All such calls must be made by use of a valid credit card and the cost of such calls shall not be charged to the Site Services Contractor or KEH.

1.4.4 Sanitary Facilities: The Contractor shall furnish and service chemical or other approved sanitary toilets for use of his employees. The facilities shall conform to requirements of KEH which are available upon request.

1.5 ACCESS ROADS AND PARKING AREAS

1.5.1 Access to 200 East Area shall be through Access Gate No. 814. Access to 200 West Area shall be through the main gate.

1.5.2 Parking for Contractor's company vehicles will be made available in the vicinity of the work outside the limited area. "No Parking" signs are posted to indicate fire and emergency lanes. No on-street parking will be allowed.

1.5.3 Grass Fire Prevention: To reduce the potential for grass fires, all off-road driving shall be kept to a minimum. Each vehicle driving off-road or to remote locations, shall carry a portable fire extinguisher (10 pound ABC dry chemical, minimum), communications equipment consisting of a two-way radio or mobil phone (CB type radios are not acceptable) and a shovel. All fires shall be reported immediately to the nearest Hanford Patrol and the Hanford Fire Department.

1.6 TEMPORARY CONTROLS

1.6.1 Dust Control: The Contractor shall maintain all work areas to prevent a hazard or nuisance to others. Dust control shall be accomplished by sprinkling or other methods as approved by KEH. Sprinkling shall be repeated at such intervals to keep all parts of the disturbed area at least damp at all times, and the Contractor must have sufficient equipment on the job to accomplish this. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs. No separate or direct payment will be made for dust control and the cost thereof shall be considered incidental to and included in the Contract price.

1.6.2 Temporary Enclosures: Plastic sheeting materials used to form enclosures shall have minimum thickness of 14 mils and have fire retardant capabilities meeting the requirements of NFPA 701. Acceptable manufacturers are Winman Corporation (Plastic Division), St. Cloud, Minnesota; Lancs Industries, 1270 N.E. 124th Street, Kirkland, Washington 98034; and Protective Plastics, Inc. 230 Silver Creek Road, Greer, South Carolina 29651. Other manufacturers may be submitted to KEH for approval.

1.6.3 Traffic Control: Temporary traffic control and barricades shall be in accordance with WSDOT M41-10, Section 1-07.23(3).

1.6.3.1 Movement of vehicles and equipment: Slow moving vehicles and equipment shall not travel on Hanford Site roads during heavy traffic periods between 6:30 A.M. and 8:00 A.M., and 3:30 P.M. and 5:30 P.M. Vehicles and equipment shall not block existing roads or park on roadway shoulders.

1.6.3.2 Oversize load or vehicle: Travel of oversized load or vehicle is restricted to the hours between 9:00 A.M. and 2:30 P.M. Site permit

specified in Section 01065 is required when the load or vehicle exceeds the following dimensions:

- Width 8 feet 6 inches
- Height 14 feet
- Length 40 feet (Single unit)
48 feet (Single trailing unit)

a. Oversized Load Identification: All vehicles or loads exceeding 8 feet 6 inches in width shall have an oversized load sign displayed on the front of the towing vehicle and on the rear of the trailing unit. Red flags shall be attached to each corner of the oversized load or vehicle.

b. Escort Vehicle(s): Escort vehicles shall be equipped with oversized load signs and amber lights. On two-lane highways, escort vehicles are required in the front and rear of a load or vehicle over 10 feet wide. For multiple-lane highways, an escort vehicle is required in the rear of a load or vehicle over 14 feet wide and on the front and rear of a load or vehicle over 20 feet wide.

c. Electrical Escort: A qualified electrical escort (journeyman lineman) is required when the load or vehicle reaches a height of 14 feet or higher from the road surface, or when a clearance of at least 6 feet cannot be maintained from overhead electrical or signal lines.

1.7 FIELD OFFICE

1.7.1 A field office equipped and staffed to conduct efficiently the work under this Contract shall be established by the Contractor. A copy of all Drawings, Specifications and other information pertinent to the proper and efficient prosecution of the Contract work shall be kept by the Contractor at this office, and the authorized representative of KEH shall have access thereto at all times. Telephone service will be made available at the Contractor's field office as set forth in Paragraph 1.4.3 providing such service is available. The Contractor may utilize existing telephones at buildings to be designated in the field by KEH for local calls.

1.7.2 All portable or relocatable structures, including trailers utilized by Contractor for field offices or storage shall be anchored or tied down to prevent overturning and lateral movement in winds up to 70 mph. The underfloor area shall be enclosed or skirted with material that will not burn or support combustion. The purpose of this requirement is for prevention of wind-blown debris accumulation and the use of underfloor space for material storage. Anchoring and enclosure shall be in accordance with anchoring and enclosure methods submitted and shall be completed within 14 days of arrival on site.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01610

DELIVERY, STORAGE, AND HANDLING

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RAILROAD AVAILABLE

1.3.1 Railroad shipments are possible into the boundaries of the Hanford Site. If the Contractor elects to utilize rail transportation the shipments shall be accomplished in accordance with this Section.

1.3.2 Carload shipments may be made to Richland, Washington, over Washington Central Railroad from Burlington Northern or Union Pacific Railroads. KEH will arrange for movement of rail cars from Richland to any available spurs or sidings on the Government owned railroad system within the Hanford Site. KEH is not liable for demurrage charges, or for loss or damage to the car or lading, unless loss or damage is due to the fault or negligence of KEH.

1.3.3 The Contractor shall make his own investigation as to availability of rail spurs or sidings in the vicinity of the worksite. Use of spurs will be coordinated with other users at the Site. The Contractor shall notify KEH not less than two working days before the scheduled arrival of carload shipments.

1.3.4 Equipment and labor required for unloading, transporting, and handling shall be furnished by the Contractor. Each carload must be unloaded within three working days after arrival, unless time extension is granted by KEH.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 01630

PRODUCT OPTION AND SUBSTITUTION

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.3 GENERAL

1.3.1 Products include material, equipment and systems and shall meet the requirements of the Specifications and referenced standards.

1.3.2 Material and workmanship shall meet requirements of Section 13 of the Contract General Conditions.

1.3.3 Components required to be supplied in quantity within Specification sections shall be the same and be interchangeable.

1.3.4 Do not use materials and equipment removed from existing structure, except as specifically required, or allowed, by Contract Documents.

1.4 PROCEDURES

1.4.1 Submittal of Substitution Approval Request Form 1151.00, sample appended, is not required when product is specified by reference standards, or by description, and proposed product meets the standards or complies with the description.

1.4.2 Submittal of Form 1151.00 is required when product is specified by naming models of one or more manufacturers, and product is not named, and not similar to those named.

1.4.3 Limitations on Substitutions

1.4.3.1 Substitutions will not be considered when indicated or implied on fabricator drawings or product data submittals without separate formal request, when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.

1.4.3.2 Substitute products shall not be ordered or installed without written acceptance.

1.4.3.3 Only one request for substitution for each product will be considered. When substitution is not accepted, provide specified product.

1.4.3.4 KEH will determine acceptability of substitutions based on technical requirements and cost related to substitution incurred by KEH.

1.4.4 Requests for Substitutions

1.4.4.1 Submit separate request for each substitution using Form KEH 1151.00. Document request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.

1.4.4.2 Identify product by Specification Section and Article or Paragraph numbers. Provide manufacturer's name and address, trade name of product, and model or catalog number. List fabricators and suppliers as appropriate.

1.4.4.3 Attach as minimum product data specified in Section 13 of the Contract General Conditions.

1.4.4.4 Give itemized comparison of proposed substitution with specified product, listing variations, and reference to Specification Section and Article or Paragraph numbers.

1.4.4.5 Give quality and performance comparison between proposed substitution and specified product.

1.4.4.6 List availability of maintenance services and replacement materials.

1.4.4.7 State effect of substitution on construction schedule, and changes required in other work or products. If substituted product requires or necessitates revisions to structures, foundations, footings, services, systems, piping, electrical, etc, cost of engineering and construction shall be borne by Contractor. Contractor shall submit for approval drawings, calculations, and vendor data which clearly show revisions to accommodate substitution.

1.4.5 Contractor Representation

1.4.5.1 Request for substitution constitutes representation that Contractor has investigated proposed product and has determined it is equal to or superior to specified product.

1.4.5.2 Contractor shall provide same warranty for substitution as for specified product.

1.4.5.3 Contractor shall coordinate installation of accepted substitute, making changes required for work to be completed.

1.4.5.4 Contractor waives claims for additional costs related to substitution which may later become apparent.

1.4.5.5 Contractor waives claim for additional performance time resulting from product substitution.

1.4.6 Submittal

1.4.6.1 Submit 13 copies of request for substitution.

1.4.6.2 KEH will review Contractor's request for substitutions with reasonable promptness.

1.4.6.3 For accepted products, submit fabricator drawings, product data, and samples required in Section 01300.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

From (Contractor) _____ Contract No. _____

Project _____

Description of Proposed Substitution _____

We hereby submit for consideration the following product instead of specified item for above project:

Specification No. _____ Section _____

Drawing No. _____ Section or Zone _____

Specified Item _____

Proposed Substitution _____

Attach complete technical data, including laboratory tests and samples, as applicable.

Provide detailed comparison of the significant qualities (system performance, interface requirements, size weight, durability, performance and similar characteristics, and including visual effect where applicable) for the proposed substitution of comparison with the original requirements.

Describe other changes to drawings and specifications required by proposal as outlined below and attach additional information as necessary.

Complete Each Item

A. Changes to drawing dimensions _____

B. Effect of substitution on other systems _____

C. Outline differences between proposed substitution and specified item _____

D. Manufacturer's guarantees of proposed and specified items are:

_____ Same _____ Different (explain on attachment)

Undersigned attests function, and quality equality equivalent or superior to specified item and has reviewed General Conditions paragraph GC-13 for assignment of responsibility if the substitution is approved.

Submitted By _____		Signature _____	
Address _____		Date _____	
		Phone _____	

KEH-1151.00 (10-87)

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 REFERENCES: Not Used

1.2 SUBMITTALS: Not Used

1.3 RECORD REQUIREMENTS

1.3.1 The nature of the work at the Hanford Site requires that certain documents, as defined herein, be held to record the construction process and the administration of the Contract. KEH is responsible for assembling all pertinent data for final disposition. The Contractor is responsible for preparing, preserving, and delivering those Project Record Documents to KEH required by this Contract. These documents are in addition to those submittals required in Section 01300.

1.3.2 Project Record Documents shall be marked by the Contractor to identify those copies for record and to prevent their use for construction. Record copies of construction documents shall be kept in the Contractor's Field Office and shall be available to KEH during the progress of the work.

1.3.3 Some data required for Project Records are delivered to KEH during the course of construction and contract administration, while other required records are assembled after completion of construction for delivery to KEH. In all situations the Contractor is required to document the delivery by retaining a copy of reports delivered during course of work until construction completion, retaining a copy of letter of transmittal itemizing delivered items, or other means acceptable to KEH.

1.4 PROJECT RECORD DOCUMENTS

1.4.1 General: The documents required for Project Record are itemized herein. Each document shall be identified by Title or Number and shall be complete. All notes or markings added by hand shall be legible utilizing a permanent non-smearing marking media, such as ink or felt tip markers, in contrasting color.

1.4.2 Storage and Marking: One set of Drawings and the Contract Documents, including Addenda and Modifications to the Contract, shall be stored in the Field Office apart from documents used in construction and shall be maintained in a clean, dry, and legible condition. Legibly mark each item to record actual construction, including changes to dimensions and details, manufacturer's name, catalog number, and substitute products.

1.4.3 Certified Payrolls: Each week certified payrolls, as required by Section 108 of the Contract General Conditions, shall be filed with KEH and copies kept in Field Office until Contract completion. No progress payments will be processed unless all certified payrolls for the work period have been received by KEH.

1.4.4 Daily Force and Equipment Report: Before noon each day, the Contractor shall furnish to KEH one copy of a detailed Daily Force Report covering all labor and supervision of the Contractor and each of his lower tier contractors for the previous day. The report shall include a general description of the work performed and list major items of equipment on-site.

1.4.5 Weekly Manpower Report: A weekly manpower report completed daily and submitted weekly (before 10:00 a.m. on Monday for the previous week) is required during the performance period of subject Contract. Forms for Contractor's use in documenting the foregoing will be furnished by KEH.

1.4.6 Backfill Permits: Retain all backfill permits approved for the work as required in Section 02200.

1.4.7 Soil Compaction Procedure: Retain all Forms KEH-382 completed for the work as required in Section 02200 and Section 02235.

1.4.8 Soil and Asphalt Tests: If the Contractor elects to test any soil or asphalt or to have independent test performed, copies of such tests shall be given to KEH.

1.4.9 Pour Slips: After obtaining KEH approval of concrete pour slip required in Section 03300, give copy to KEH and retain Contractor copy until Contract closeout and then forward to KEH.

1.4.10 Trip Tickets: Deliver to KEH with each truck load of concrete as required in Section 03300 and retain Contractor copy until Contract closeout and then forward to KEH.

1.4.11 Concrete Tests: If the Contractor elects to test concrete or to have independent tests performed, copies of such tests shall be given to KEH.

1.4.12 Visual Weld Inspection Documentation: Provide documentation of inspections.

1.4.13 Surface Inspection: Provide documentation that surfaces to be coated are satisfactory.

1.4.14 Pre-engineered Structures: Final inspection documentation.

1.4.15 Electrical Test Reports: Provide reports of all tests as required in Sections 16300, 16400, and 16720.

1.4.16 Product Samples and Manufacturer's Instructions: In addition to submittals required in Section 01300 and requirements of this Section, any information received by the Contractor from suppliers that can document products used and how products were installed shall be forwarded to KEH for Project Records.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 653-88 Standard Terminology Relating to Soil, Rock, and Contained Fluids

1.1.1.2 Washington Industrial Safety and Health Act (WISHA)

Washington Administrative Code (WAC)

Title 296, Labor and Industries
Chapter 296-155 WAC, Safety Standards for Construction Work

Part N Excavation, Trenching, and Shoring

1.1.1.3 Washington State Department of Transportation (WSDOT)

M41-10-88 Standard Specifications for Road, Bridge, and Municipal Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Method to Prevent Damage During Excavation: Submit procedures proposed to prevent overstressing existing structures or interrupting service to existing facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Obtain select soils from excavation or other designated locations. Obtain on-site approval for soils.

2.1.2 Fill or Backfill

2.1.2.1 Structural: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.2.2 Common: Well graded soil mixtures containing cobbles up to 8 inches in greatest dimension if uniformly distributed and not constituting more than 40 percent of volume of fill.

2.1.3 Bedding for Underground Pipe and Conduit: Sand, defined in ASTM D 653 or excavated sandy material having less than 20 percent by volume gravel particles and maximum dimension of 1/2 inch.

2.1.4 Stabilization: Gravel, in accordance with WSDOT M41-10, Section 9-03.9(3), Top Course.

2.1.5 Plastic Sheet Marker: 6 inch wide detectable tape similar to "Terra Tape D" manufactured by Griffolyn Co, Inc. Tape shall be imprinted with warning such as "Caution Buried Installation Below" at intervals of not more than 4 feet.

PART 3 - EXECUTION

3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 Locate and expose underground utilities by hand tools. Use of heavy equipment and machinery is subject to approval of KEH.

3.1.3 Slope sides of excavations or trenches more than 4 feet deep in accordance with WISHA Chapter 296-155 WAC, Part N, Table N-1.

3.1.4 Shore excavations more than 4 feet deep and with sides sloped steeper than 1-1/2 horizontal to 1 vertical. Install shoring as excavation progresses and remove as backfilling is accomplished.

3.1.5 Do not store excavated or other material closer than 2 feet from edge of excavation unless barrier is erected to retain excavated materials. Store and maintain materials in manner that they are prevented from falling or sliding into excavation.

3.1.6 Wherever slopes of excavations will intersect existing underground lines or structures such as building foundations, underground piping, electrical ducts or direct buried electrical lines, install shoring or other means of support to prevent overstressing existing structure or underground lines or to prevent interrupting service to existing buildings.

3.1.7 Footings and Foundations

3.1.7.1 Make excavations for footings to depth shown on the Drawings or to further depth as necessary to provide undisturbed surface to receive footing. Make excavations to proper width with allowances made for forms and bracing. Make bottom of excavations compact, level, true, and free of loose material.

3.1.7.2 If over-excavation occurs where footings are designed to be placed on undisturbed earth, correct at time of placing concrete by

extending concrete down to undisturbed earth, or by placement of backfill, compacted in accordance with subparagraph 3.2.1.2b, Method C.

3.1.8 Trenches for Underground Piping and Conduit

3.1.8.1 Make excavations to line and grade shown on the Drawings and wide enough to make connections. Excavate with near vertical sides from bottom of trench up to 1 foot above utility lines. Excavate trench deep enough to permit placement of compacted sand bedding, 4 inches minimum thickness, beneath lines except where excavation is in undisturbed sand which will serve as bedding or where lines are to be encased in concrete. Pare holes in trench bottoms for pipe couplings so pipe will bear full length of barrel or section.

3.1.8.2 Install shoring to hold materials and surcharge pressure for full depth of trench.

3.1.8.3 Keep trenches free of standing water when laying is in progress.

3.1.8.4 If over-excavation occurs, correct by placement of structural backfill.

3.1.9 Where stabilization is required, finish subgrade 3 inches below elevations shown on the Drawings.

3.2 INSTALLATION

3.2.1 Fill and Backfill

3.2.1.1 General

a. Backfill Permit: Do not start fill or backfill without approved permit as set forth in Section 01065.

b. Remove debris and organic matter from area to be filled or backfilled.

c. Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter and trash.

d. Do not place fill or backfill on frozen ground.

e. Filling or backfilling by sluicing or flooding with water will not be permitted.

f. Bring fill or backfill up evenly on sides of walls, structures and utility lines to avoid unbalanced loading.

g. Do not place fill or backfill against concrete structure or foundation wall less than 14 days after completion of structure or wall unless written permission from KEH is obtained. Provide wall support, where noted on the Drawings, before filling or backfilling.

3.2.1.2 Structural

a. Before placement of fill or backfill, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

b. Place backfill in accordance with WSDOT M41-10, Section 2-03.3(14)C and approved procedure as follows.

1) Use Method C under foundations, slabs and pipelines.

2) Use Method B under pavements and roads, and within 5 feet of buildings, fences, other structures, or poles supporting electric lines or pipe.

c. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

3.2.1.3 Common

a. Place fill or backfill in layers not more than 12 inches thick, loose measurement.

b. Compact each layer, full width, by at least 1 pass of vibratory or rammer type compactor, pneumatic-tired roller, loaded scraper wheel, grader wheel or power roller.

c. Mound over top layer of backfill to depth of 1 inch for each 12 inches of trench depth to maximum mound height of 6 inches.

3.2.1.4 Underground piping and conduit trenches

a. Bedding placed beneath utility lines in trenches shall be material meeting the requirements of Paragraph 2.1.3.

b. Place and compact bedding in trench prepared according to subparagraph 3.1.7.1 before laying utility lines. Compact bedding as specified for structural backfill.

c. Place backfill over joints in underground pipes only after pressure testing of line has been completed.

d. Backfill under conduit and haunches of pipe, around sides, and up to one foot above top of pipe or conduit with bedding material. Place and compact material same as specified for structural backfill. Compact with care, to avoid misalignment of pipe and provide uniform bearing along barrel of pipe.

e. Backfill utility trenches from elevation 1 foot above top as follows.

1) For locations specified in subparagraph 3.2.1.2, use structural backfill.

2) Use common backfill in accordance with subparagraph 3.2.1.3 for other locations.

f. Do not allow heavy construction equipment to pass over buried lines until at least 2 feet of backfill has been placed over line or until bridging has been placed across trenching and approved by KEH.

3.2.2 Plastic Sheet Marker: Place continuous over buried utility lines. Place marker tape directly over line and 1 foot below finish grade. Place marker over each outside pipe of multiple lines. Place intermediate markers at maximum of 4 feet apart.

3.2.3 Finish Grading and Stabilization

3.2.3.1 Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

3.2.3.2 Stabilize area disturbed by work and as indicated on the Drawings with 3 inch course of gravel meeting the requirements of Paragraph 2.1.4. Finish stabilization course to elevations shown on the Drawings.

3.3 FIELD QUALITY CONTROL

3.3.1 Soil Compaction Tests: Sampling and testing of compacted fill and backfill will be performed by KEH.

SOIL COMPACTION PROCEDURE

Project Number	Project Title	Date
Contract Number	Procedure Number	Location of Demonstration
REQUIREMENTS		EQUIPMENT DEMONSTRATED
Applicable Spec./Dwg.	Type	
Compaction Required	%	Manufacturer
Maximum Lift Size	Model	
LABORATORY SOIL TEST RESULTS		
<input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609)	<input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A)	<input type="checkbox"/> In-Situ
Maximum Density _____ Moisture % _____	<input type="checkbox"/> Density Chart Attached	Density _____
COMPACTION DEMONSTRATION TEST RESULTS		
Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$		
No. of Passes	Depth of Lift	Percent Moisture
Lbs/ft³ Dry	Maximum Density	Percent Compaction
Accept	Reject	
Observations or Comments		
<div style="font-size: 4em; opacity: 0.2; transform: rotate(-15deg); pointer-events: none;">SAMPLE</div>		
TEST METHOD USED FOR DEMONSTRATION	<input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017)	<input type="checkbox"/> Other
Contractor Representative		Date
Engineer/Constructor Inspector		Date

KEH-0382.00 (03/89)

INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Engineer/Constructor Inspector, documents witnessing and verifying the compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Engineer/Constructor Inspector.

Section B is completed by the Engineer/Constructor Inspector. Data entered is obtained from the agency or individual that performed testing.

Section C is completed by the Engineer/Constructor Inspector as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Engineer/Constructor Inspector to signify witnessing and verification.

KEH-0382.00R (03/89)

END OF SECTION

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SECTION 02235

ROAD SUBGRADE AND GRANULAR BASE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for
Road, Bridge, and Municipal
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Subgrade Fill and Backfill

2.1.1.1 General: Obtain select soils from excavation or other designated locations. Obtain on-site approval for soils.

2.1.1.2 Fill or backfill: Well graded soil mixtures which may contain cobbles up to 3 inches in greatest dimension if uniformly distributed and not constituting more than 20 percent of volume of fill.

2.1.2 Granular Base

2.1.2.1 Base course: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Base Course Classification.

2.1.2.2 Leveling course: Meeting the requirements of WSDOT M41-10, Section 9-03.9(3), Top Course Classification.

2.1.2.3 Crushed gravel shoulder: Same as leveling course.

PART 3 - EXECUTION

3.1 EXCAVATION

3.1.1 Before performing excavation, obtain excavation permit. Excavation permits will be furnished as set forth in Section 01065.

3.1.2 If over-excavation occurs, correct by placement of backfill as specified in subparagraph 3.2.2.2.

3.2 INSTALLATION

3.2.1 Subgrade Filling and Backfilling

3.2.1.1 Remove debris and organic matter from area to be filled or backfilled.

3.2.1.2 Use only select materials for fill or backfill. Keep materials free of frozen particles, lumps, organic matter and trash.

3.2.1.3 Do not place fill or backfill on frozen ground.

3.2.1.4 Filling or backfilling by sluicing or flooding with water will not be permitted.

3.2.2 Fill or Backfill

3.2.2.1 Before placement of fill or backfill, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of soils will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.2.2 Place backfill under roads in accordance with WSDOT M41-10, Section 2-03.3(14)C, Method B.

3.2.3 Granular Base

3.2.3.1 Before placement of granular base, demonstrate, to KEH by physical test at site, that procedure proposed for installation and compaction of base will provide degree of compaction specified. Prepare "Soil Compaction Procedure" Form KEH-382, sample appended, in accordance with printed instructions. Forms will be furnished by KEH.

3.2.3.2 Construction Requirements: Construction shall be in accordance with following sections of WSDOT M41-10.

- a. Subgrade: Section 2-06.3.
- b. Equipment: Section 4-04.3(1).
- c. Mixing: Section 4-04.3(3).
- d. Placing and spreading: Section 4-04.3(4).
- e. Miscellaneous requirements: Section 4-04.3(7).
- f. Weather limitations: Section 4-04.3(8).
- g. Hauling: Section 4-04.3(9).

3.2.3.3 Shaping and Compacting

a. Final shaping before compacting shall be accomplished using approved equipment and shall be in accordance with WSDOT M41-10, Section 4-04.3(5).

b. Compaction control tests will be in accordance with WSDOT M41-10, Section 2-03.3(14)D.

3.2.3.4 Shoulders: Construct shoulders, of width shown on the Drawings, after placement of asphaltic wearing course.

3.2.4 Finish Grading and Stabilization: Rake area disturbed by work, remove surface stones larger than 6 inches and dispose of excess material and debris at area designated by KEH.

3.3 FIELD QUALITY CONTROL

3.3.1 Sampling and testing of compacted fill and backfill will be performed by KEH.

SOIL COMPACTION PROCEDURE

Project Number	Project Title	Date					
Contract Number	Procedure Number	Location of Demonstration					
REQUIREMENTS		EQUIPMENT DEMONSTRATED					
Applicable Spec./Dwg.		Type					
Compaction Required %		Manufacturer					
Maximum Lift Size		Model					
LABORATORY SOIL TEST RESULTS							
B <input type="checkbox"/> Non-granular Materials (WSDOT Test Method No. 609) <input type="checkbox"/> Granular Materials (WSDOT Test Method No. 606-A) <input type="checkbox"/> In-Situ Maximum Density _____ Moisture % _____ <input type="checkbox"/> Density Chart Attached Density _____							
COMPACTION DEMONSTRATION TEST RESULTS							
Formula for Percent Compaction: $\frac{\text{dry density}}{\text{max density}} \times 100 = \text{Percent Compaction}$							
No. of Passes	Depth of Lift	Percent Moisture	Lift¹ Dry	Maximum Density	Percent Compaction	Accept	Reject
Observations or Comments							
SAMPLE							
TEST METHOD USED FOR DEMONSTRATION			<input type="checkbox"/> Nuclear Gage (ASTM D2922 & D3017)		<input type="checkbox"/> Other _____ _____		
Contractor Representative						Date	
Engineer/Constructor Inspector						Date	

KEH-0302.00 (03/89)

INSTRUCTIONS

This Soil Compaction Procedure form, when approved by the Engineer/Constructor Inspector, documents witnessing and verifying the compaction procedure.

Section A is the responsibility of the Construction Contractor. It is to be completed at the time of backfill compaction demonstration and presented to the Engineer/Constructor Inspector.

Section B is completed by the Engineer/Constructor Inspector. Data entered is obtained from the agency or individual that performed testing.

Section C is completed by the Engineer/Constructor Inspector as the demonstration is performed. Using the applicable formula, the percent compaction achieved is determined and entered. Acceptance is based on the results as compared with the compaction percent required in Section A.

Section D is signed and dated by the Construction Contractor Representative acknowledging responsibility for this procedure and compliance thereto for applicable backfill operations. Section D is signed and dated by the Engineer/Constructor Inspector to signify witnessing and verification.

KEH-0382.00R (03/89)

END OF SECTION

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SECTION 02512

HOT-LAID ASPHALTIC CONCRETE PAVEMENT

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI D6.1-1978, w/Rev
through Dec 1983

American National Standard
Manual on Uniform Traffic
Control Devices for Streets and
Highways

1.1.1.2 Washington State Department of Transportation (WSDOT)

M41-10-88

Standard Specifications for
Road, Bridge, and Municipal
Construction

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Laboratory Reports: Submit laboratory reports for following.

1.2.1.1 Asphalt: Showing that asphalt used in mix meets the requirements of AR-4000W in accordance with WSDOT M41-10, Section 9-02.1(4).

1.2.1.2 Asphalt concrete mix: Showing compliance with WSDOT M41-10, Sections 9-03.8(2) and 9-03.8(6). Include Rice density as established by WSDOT Method 705.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Asphalt: Meeting the requirements of WSDOT M41-10, Sections 9-02.1(2) and 9-02.1(4). Grade of paving asphalt for use in asphaltic concrete mixture shall be AR-4000W.

2.1.2 Aggregate: Class "B" meeting the requirements of WSDOT M41-10, Section 9-03.8(1),(2), (3)B.

2.1.3 Blending Sand: Meeting the requirements of WSDOT M41-10, Section 9-03.8(4).

2.1.4 Mineral Filler: Meeting the requirements of WSDOT M41-10, Section 9-03.8(5).

2.2 MIXES

2.2.1 Proportioning of Asphalt Concrete Materials: Meeting the requirements of WSDOT M41-10, Section 9-03.8(6) Class "B" asphalt concrete.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Construction: In accordance with following sections of WSDOT M41-10.

3.1.1.1 Asphalt mixing plants: Section 5-04.3(1).

3.1.1.2 Hauling equipment: Section 5-04.3(2).

3.1.1.3 Asphalt pavers: Section 5-04.3(3).

3.1.1.4 Rollers: Section 5-04.3(4).

3.1.1.5 Existing surface conditioning: Section 5-04.3(5). No prime coat required.

3.1.1.6 Asphalt material heating: Section 5-04.3(6).

3.1.1.7 Aggregate preparation: Section 5-04.3(7).

3.1.1.8 Mixing: Section 5-04.3(8).

3.1.1.9 Spreading and finishing: Section 5-04.3(9).

3.1.1.10 Compaction: Section 5-04.3(10). Control may be performed by the Virginia Breakover Method.

3.1.1.11 Joints: Section 5-04.3(11).

3.1.1.12 Samples: Section 5-04.3(12).

3.1.1.13 Surface smoothness: Section 5-04.3(13).

3.1.1.14 Heating-planing bituminous pavement: Section 5-04.3(14).

3.1.1.15 Weather limitations: Section 5-04.3(16).

3.1.1.16 Asphalt change in grade: Section 5-04.3(18).

3.1.1.17 Driving surface sealing: Section 5-04.3(19).

3.1.2 Pavement Striping: In accordance with ANSI D6.1, Section III and WSDOT M41-10, Section 8-22.

3.2 FIELD QUALITY CONTROL

3.2.1 Sampling and testing of asphalt concrete pavement will be performed by KEH.

END OF SECTION

SECTION 02650
PIPED UTILITIES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979	American National Standard Safety Color Code for Marking Physical Hazards
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1.1.1.2 American Society for Testing and Materials (ASTM)

A 307-88a	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
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A 563-88a	Standard Specification for Carbon and Alloy Steel Nuts
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D 2321-83a	Standard Practice for Underground Installation of Flexible Thermo-plastic Sewer Pipe
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1.1.1.3 American Water Works Association (AWWA)

C104-85	American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
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C110-87	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids
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C111-85	American National Standard for Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
---------	--

C600-87	AWWA Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
---------	--

- C651-86 AWWA Standard for Disinfecting Water Mains
- C900-81 AWWA Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. Through 12 in., for Water
- M23-80 AWWA Manual for PVC Pipe-- Design and Installation
- 1.1.1.4 International Association of Plumbing and Mechanical Officials (IAPMO)
1988 Edition Uniform Plumbing Code (UPC)
- 1.1.1.5 National Fire Protection Association (NFPA)
NFPA 24 Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 1987 Edition
- 1.1.1.6 Washington State Department of Transportation (WSDOT)
M41-10-88 Standard Specifications for Road, Bridge, and Municipal Construction
- 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.
- 1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.
- 1.2.2 Leak/Pressure Test Procedures: Submit procedures outlining proposed methods of testing joints in piping systems.
- 1.2.3 NFPA Test Certificate: Submit completed Contractor's Material and Test Certificate in accordance with NFPA 24, Section 8-9.3.4.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General

2.1.1.1 Components of new underground piping system, if not designated in this Section and the Drawings by manufacturer's name and model or figure number, shall be current products of manufacturer.

2.1.2 Pipe and Fittings: Meet the requirements of pipe codes in this Section and details on the Drawings.

2.1.3 Valves: Specified in pipe codes and provided with adjustable cast iron valve boxes.

- 2.1.4 Indicator Posts: See Section 02668.
- 2.1.5 Bitumastic: Koppers No. 550 or Superservice Black.
- 2.1.6 Painting: See Section 09900.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 General

3.1.1.1 Install piping and piping accessories in accordance with the Uniform Plumbing Code (UPC), NFPA 24, the Pipe Codes, the Drawings, and this Section.

3.1.1.2 Keep piping systems clean during work. Once fabrication has started on length of pipe, plug or cap open ends when installation is not in progress to prevent entry of dirt and other foreign material.

3.1.1.3 Where piping is laid in trench, trench shall be free of frost or frozen earth and standing water.

3.1.2 Polyvinyl Chloride (PVC) Pipe

3.1.2.1 Protect from impact shocks and dropping. Before laying, inspect and discard damaged sections. PVC piping shall not be installed in the vertical position.

3.1.2.2 Start laying in finished trenches at lowest point of run and progress upgrade. Support pipe full length of barrel.

3.1.2.3 Handle pipe and accessory materials in accordance with AWWA M23, Chapter 6.

3.1.2.4 Install with alignment and grade in accordance with ASTM D 2321, Section 02200, and the Drawings.

3.1.2.5 Support valve and cast-iron fitting weight on concrete cradle, or concrete blocks with anchors.

3.1.2.6 Install restraints on pipe and piping components in accordance with NFPA 24, Article 8-6 and A-8-6.2. Restraining mechanical joints as listed in UL Fire Protection Equipment Directory may be substituted for conventional anchoring. Where thrust blocks are used, make bearing area equal to area shown in Table 8-6.2.9 multiplied by a factor of 1.33 and as shown on the Drawings.

3.1.3 Coat carbon steel accessories, which will be buried, such as tie-rods and clamps, with bitumastic. Allow time for bitumastic to dry before backfilling.

3.1.4 Install post barricades around fire hydrants and post indicator valves in accordance with the Drawings and this Section.

3.1.5 Excavation, backfill, and grading work shall meet the requirements of Section 02200 as it applies.

3.1.6 Repair asphaltic concrete pavement removed for installation of piping in accordance with Section 02512.

3.1.7 Painting and Marking

3.1.7.1 Surface preparation, materials, and coating application of primer and paint shall be in accordance with Section 09900, Paragraphs 3.2.1 and 3.5.1.

3.1.7.2 Colors: Defined in ANSI Z53.1.

a. Upper barrel of indicator posts red.

b. Barricade posts red.

3.1.8 Flushing

3.1.8.1 Obtain written method for disposal of flushing water from KEH.

3.1.8.2 After installation, before pressure testing completed system, flush piping with water until effluent is clean and contains no visible particulate matter but in no case for less than one minute.

3.1.8.3 Use sanitary water for flushing sanitary water lines.

3.1.8.4 Flush new sanitary water piping in accordance with NFPA 24, Article 8-8.

3.2 FIELD QUALITY CONTROL

3.2.1 Hydrostatic Testing

3.2.1.1 Furnish instruments, facilities and labor required to conduct tests.

3.2.1.2 Document leak/pressure testing of sanitary waterlines on the NFPA Test Certificate.

3.2.1.3 Perform leak tests in presence of KEH unless otherwise instructed in writing.

3.2.1.4 Perform tests after lines have been flushed and before backfilling.

3.2.1.5 Before applying test pressure to piping, install necessary restraining devices to prevent distortion or displacement of piping.

3.2.1.6 Install 1 temporary relief valve during pressure testing of systems. Relief valve shall have discharge capacity of at least 125 percent

capacity of pressurizing device and be set to operate at not more than 110 percent of test pressure. Demonstrate proper operation of relief valve at following times.

a. Before each series of leak tests before relief valve is attached to system.

b. Whenever KEH has cause to question operating accuracy of relief valve.

3.2.1.7 Verify air has been expelled from piping before applying hydrostatic pressure.

3.2.1.8 Test new Pipe Code A in accordance with NFPA 24 Article 8-9. Leakage at joints shall not exceed limits specified in NFPA 24, Article 8-9. Repair unsatisfactory joints and retest.

3.2.1.9 If lines are subject to freezing, remove water upon completion of hydrostatic test.

3.3 DISINFECTION

3.3.1 Disinfect sanitary water lines in accordance with AWWA C651.

3.3.2 Arrange for bacteriological testing of water samples with KEH before performing disinfection procedures. Bacterial analysis is 4 days in length from time samples are received in laboratory. Analysis provides "presumptive" results in 2 days with "confirmation" at end of test.

PIPE CODE A

Service:	Maximum Operating Pressure:	Test Pressure:	Maximum Operating Temperature:
Sanitary Water (SW)	120 psig	180 psi	100 F

Sizes	12 inch and larger.
Pipe	PVC in accordance with AWWA C900.
Joints	Elastomeric-gasket couplings in accordance with AWWA C900.
Wall Thickness	Class 200, DR 14.
Fittings	Cast iron or ductile iron in accordance with AWWA C110 with cement lining in accordance with AWWA C104 and mechanical or push-on joints in accordance with AWWA C111.
Tapping Valve	Flanged by MJ ends, Kennedy Fig. 950XP or Mueller #H-667.
Gate Valves	3 inch, flanged, Stockham Fig. G-612. 8 inch, mechanical or push-on joints, Kennedy Fig. 70X or 71X. 12 inch, mechanical or push-on joints, Kennedy Fig. 70X or 71X.
Flexible Couplings	Compression type slip-on steel, Dresser type 38 or 138.
Combination Air Valves	3 inch, APCO #147C.3.
Bolting	Carbon steel heavy hex series bolts, ASTM A 307, Grade B, and heavy hex nuts, ASTM A 563, Grade A.
Gaskets	Use full face gaskets with flat face flanges. Compressed synthetic fiber, 1/16 inch thick, Anchor Packing #443.

SECTION 02668

FIRE WATER SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI Z53.1-1979 American National Standard
Safety Color Code for Marking
Physical Hazards

1.1.1.2 American Water Works Association (AWWA)

C104-85 American National Standard for
Cement-Mortar Lining for
Ductile-Iron Pipe and Fittings
for Water

C110-87 American National Standard for
Ductile-Iron and Gray-Iron
Fittings, 3 in. Through 48 in.,
for Water and Other Liquids

C111-85 American National Standard for
Rubber-Gasket Joints for
Ductile-Iron and Gray-Iron
Pressure Pipe and Fittings

C151-86 American National Standard for
Ductile-Iron Pipe,
Centrifugally Cast in Metal
Molds or Sand-Lined Molds, for
Water or Other Liquids

C600-87 AWWA Standard for Installation
of Ductile-Iron Water Mains and
Their Appurtenances

C651-86 AWWA Standard for Disinfecting
Water Mains

1.1.1.3 Factory Mutual System (FM)

1991 Edition Approval Guide

- 1.1.1.4 National Fire Protection Association (NFPA)
NFPA 24 Standard for the Installation
of Private Fire Service Mains
and Their Appurtenances,
1987 Edition
- 1.1.1.5 Underwriters Laboratories, Inc (UL)
1991 Fire Protection Equipment
Directory
- 1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.
- 1.2.1 Approval Data: Submit information listed in Column 5 of Approval
Data List in this Section.
- 1.2.2 Vendor Information: Submit information listed in Column 5 of
Vendor Information List in this Section.
- 1.2.3 NFPA Test Certificate: Submit completed Contractor's Material
and Test Certificate in accordance with NFPA 24, Section 8-9.3.4.

PART 2 - PRODUCTS

2.1 MATERIALS

- 2.1.1 General: System is designed for a maximum operating pressure of
125 psig.
- 2.1.2 Piping
- 2.1.2.1 Pipe, pipe joints and fittings shall meet the requirements of
NFPA 24, the Drawings and this Section.
- 2.1.2.2 Pipe: Cement lined meeting the requirements of AWWA C104 and
ductile iron, Class 50 minimum, meeting the requirements of AWWA C151. Pipe
shall have rubber gasketed mechanical joints meeting the requirements of
AWWA C111.
- 2.1.2.3 Fittings: Cement lined meeting the requirements of AWWA C104,
with joints and pressure class ratings compatible with pipe used and shall
meet the requirements of AWWA C110.
- 2.1.3 Painting: See Section 09900.

2.2 EQUIPMENT

- 2.2.1 Components of new underground fire protection system, including
pipe and fittings, if not designated in this Section and the Drawings by
manufacturer's name and model or figure number, shall be current products of
the manufacturer, and be listed or approved for intended use by UL or FM.
Components designated by manufacturer or trade name shall be supplied. No
substitutions will be accepted.

2.2.2 Post Indicator Valve (PIV)

2.2.2.1 Gate valve: Kennedy nonrising stem valve with indicator post flange. Valve shall open in counterclockwise direction.

2.2.2.2 Indicator post: Adjustable, telescoping barrel type with locking handle and clearly visible, position indicator sign plates, protected by nonbreakable plastic windows. Post shall be matched for assembly to gate valve.

2.2.3 Switches: Valve Position Supervisory Limit Switches for Installation on Post Indicator Valves: Potter Model PIVSV-A. Shall be tamperproof and designed for use intended. Switch shall be operated during first 2 revolutions of handle in closing direction.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Install piping and piping accessories in accordance with NFPA 24, AWWA C600, the Drawings, and this Section.

3.1.2 Protect pipe and fittings from impact shocks and dropping. Before laying, inspect pipe and discard damaged components. Remove damaged components from job site.

3.1.3 Keep piping systems clean during work. Once fabrication has started on length of pipe, plug or cap open ends of piping when installation is not in progress to prevent entry of dirt and other foreign material. Inner surfaces of pipe, valves, and fittings shall be smooth, clean, and free of sand, debris and dirt when installed.

3.1.4 Where piping is laid in trench, trench shall be free of frost or frozen earth and standing water.

3.1.5 Install new fire mains minimum depth of 3'-6" from grade to top of pipe.

3.1.6 Install restraints on pipe and piping components in accordance with NFPA 24, Article 8-6 and A-8-6.2. Restraining mechanical joints as listed in UL Fire Protection Equipment Directory may be substituted for conventional anchoring. Where thrust blocks are used, make bearing area equal to area shown in Table 8-6.2.9 multiplied by a factor of 1.33 and as shown on the Drawings.

3.1.7 Coat carbon steel accessories which will be buried, such as tie-rods and clamps, with bitumastic. Allow time for bitumastic to dry before backfilling.

3.1.8 Install post barricades around post indicator valves in accordance with the Drawings and this Section.

3.1.9 Excavation, backfill and grading work shall meet the requirements of Section 02200 as it applies.

3.1.10 Repair asphaltic concrete pavement, removed for installation of fire water main, in accordance with Section 02512.

3.1.11 Painting and Marking

3.1.11.1 Surface preparation, materials and coating application of primer and paint shall be in accordance with Section 09900.

3.1.11.2 Colors: Defined in ANSI Z53.1.

a. Upper barrel of indicator post red.

b. Barricade posts red.

3.2 FIELD QUALITY CONTROL

3.2.1 General

3.2.1.1 Furnish equipment and instruments required to perform flushing and testing.

3.2.1.2 Perform flushing and testing while witnessed by KEH.

3.2.1.3 Remove and replace or repair apparatus, material, or work which fails in flushing or testing operations and repeat operation.

3.2.1.4 Repair damage resulting from flushing or testing.

3.2.2 Flushing

3.2.2.1 Obtain written procedure for disposal of flushing water from KEH.

3.2.2.2 Flush new piping in accordance with NFPA 24, Article 8-8.

3.2.3 Hydrostatic Testing

3.2.3.1 Perform testing in accordance with NFPA 24, Article 8-9.

3.2.3.2 Perform testing after piping has been flushed and before backfill is placed over pipe joints.

3.2.3.3 Verify that air has been expelled from piping before applying hydrostatic pressure.

3.2.3.4 Examine piping joints, fittings, and other potential leak sources during test. Leaks in piping system are not acceptable. Repair leaks and retest.

3.2.3.5 If piping system is subject to freezing, remove water from lines upon completion of tests.

3.3 DISINFECTING

3.3.1 Disinfect fire water lines in accordance with AWWA C651.

3.3.2 Arrange for bacteriological testing of water samples with KEH before performing disinfection procedures. Bacterial analysis is 4 days in length from time samples are received in laboratory. Analysis provides "presumptive" results in 2 days with "confirmation" at end of test.

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Concrete Institute (ACI)

ACI 301-84 (Revised 1988) Specifications for Structural
Concrete for Buildings

ACI 306.1-87 Standard Specification for Cold
Weather Concreting

1.1.1.2 American Society for Testing and Materials (ASTM)

A 615-87a Standard Specification for
Deformed and Plain Billet-Steel
Bars for Concrete Reinforcement

C 33-86 Standard Specification for
Concrete Aggregates

C 94-89b Standard Specification for
Ready-Mixed Concrete

C 150-86 Standard Specification for
Portland Cement

C 260-86 Standard Specification for
Air-Entraining Admixtures for
Concrete

C 494-86 Standard Specification for
Chemical Admixtures for
Concrete

C 1017-85 Standard Specification for
Chemical Admixtures for Use in
Producing Flowing Concrete

1.1.1.3 National Ready Mixed Concrete Association (NRMCA)

January 1, 1976 Certification of Ready Mixed
(Third Revision) Concrete Production Facilities

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Certification of Ready Mixed Concrete Production Facilities: Submit current legible copy of "Certificate of Conformance for Concrete Production Facilities" issued by and bearing the seal of the National Ready Mixed Concrete Association. Certificate shall contain signature and seal of registered Civil Engineer.

1.2.2 Reinforcing Steel Fabricator Drawings: Submit complete reinforcing fabrication and placing drawings based on block diagram in accordance with ACI 301, Section 5.1, including splices not shown on the Drawings.

1.2.3 Block Diagram: Submit block diagram of scheduled concrete pours. Identify pours.

1.2.4 Concrete Materials, Mix Design and Mix Proportions: Submit in accordance with ACI 301, Sections 3.8 and 16.7.3. Define each material to be used in concrete and state amount, by weight, to be utilized per cubic yard of plastic mix.

1.2.5 Cold Weather Concreting: Submit detailed procedure in accordance with ACI 306.1, Section 1.5.1.

1.2.6 Curing Procedure: Submit description of materials and methods of curing in accordance with ACI 301, Section 12.2.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Concrete

2.1.1.1 Cement: ASTM C 150, Type II (Low Alkali).

2.1.1.2 Aggregates: ASTM C 33, maximum size 3/4 inch.

2.1.1.3 Air-entraining admixture: Meeting the requirements of ASTM C 260; Sika Chemical Company "SIKA AER"; Chem-Masters Corp "Adz-Air"; or Protex Industries "Protex".

2.1.1.4 Properties (except as noted otherwise on Drawings)

a. Minimum allowable compressive strength: 4500 psi at 28 days. (3000 psi at 28 days for thrust blocks, duct banks, post.)

b. Slump: 4 inch maximum in accordance with ACI 301, Section 3.5.

c. Air content: 5 percent \pm 1.5 percent.

d. Water-cement ratio: 0.50 maximum.

- e. Cement: 540 lb/cy minimum.
- f. Proportions: In accordance with ACI 301, Sections 3.8 and 3.9.
- 2.1.1.5 Mixing: In accordance with ASTM C 94.
- 2.1.1.6 Delivery: In accordance with ASTM C 94.
- 2.1.1.7 Superplasticizer: In accordance with ASTM C 494, Type F and ASTM C 1017, Types 1 and 2.
- 2.1.2 Reinforcing Steel
 - 2.1.2.1 Steel bars: ASTM A 615, deformed, Grade 60.
 - 2.1.2.2 Tie wire: Black annealed steel, 16 gage minimum.
- 2.1.3 Joint Materials
 - 2.1.3.1 Expansion joint filler: See Section 07920.
 - 2.1.3.2 Sealant: See Type II, Section 07920.
 - 2.1.3.3 Waterstop: Polyvinyl chloride (PVC), dumbbell or serrated type, with center bulb, 6 inches wide.
 - 2.1.3.4 Dowel bars: ASTM A 36, carbon steel.
- 2.1.4 Nonshrink Grout: Nonmetallic type, "Five Star Grout" by US Grout Corp; "Por-Rok" Anchoring Cement by Hallemite; or "Masterflow 713" by Master Builders.
- 2.1.5 Forms: Wood, steel, plywood, or Masonite Corporation "Concrete Form Presdwood", as required for various specified finishes.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Form Construction

- 3.1.1.1 Install formwork in accordance with ACI 301, Section 4.2. Interior shape and rigidity shall be such that finished concrete will meet the requirements of the Drawings within tolerances specified in ACI 301, Table 4.3.1.
- 3.1.1.2 Prepare form surfaces in accordance with ACI 301, Section 4.4.
- 3.1.1.3 Forms for surfaces which will be permanently concealed from view may be saturated with water before placing concrete instead of other treatment, except in freezing weather forms shall be treated with oil or stearate.
- 3.1.1.4 Clean forms of foreign material before placing concrete.

3.2 INSTALLATION

3.2.1 Reinforcing Steel

3.2.1.1 Fabricate bars accurately to dimensions shown on Drawings, within tolerances shown in ACI 301, Section 5.6.

3.2.1.2 Tag in accordance with bar list.

3.2.1.3 Place as shown on approved submittals within tolerances specified in ACI 301, Sections 5.6 and 5.7.

3.2.1.4 Tie to prevent displacement during placement of concrete.

3.2.1.5 Do not force into concrete after initial set has started.

3.2.1.6 Place with dimension of concrete protection equal to minimum given in ACI 301, Section 5.7, except where shown otherwise on the Drawings.

3.2.1.7 Place welded wire fabric on chairs and lap two mesh at splices. Tie splices with wire.

3.2.1.8 At construction joints, grease one end of each dowel bar to prevent bonding. At any given joint, all dowel bars shall be greased on the same side.

3.2.2 Concrete

3.2.2.1 Before ordering, obtain approval of required submittals.

3.2.2.2 Before batching, obtain approval of formwork and reinforcement by KEH.

3.2.2.3 Before placing:

a. Obtain approval of "Pour Slip" by KEH. "Pour Slip" shall include appropriate reference to specific portion of structure to be placed, maximum size of coarse aggregate, design strength, admixture, and slump. "Pour Slip" forms can be obtained from KEH.

b. For each truck load, deliver "Trip Ticket" to KEH. "Trip Ticket" shall contain information listed in ASTM C 94, subparagraphs 16.1.1 through 16.1.10, and include water/cement ratio.

3.2.2.4 Place in accordance with ACI 301, Sections 8.1, 8.2, and 8.3. Do not drop (free fall) more than 5 feet. Insert vibrator, vertically if possible, into concrete and reach small distance into concrete in next lower layer. Do not insert vibrators into lower courses that have reached initial set. Take care to avoid allowing head of vibrator to come in contact with forms or embedded items.

3.2.2.5 Temper only as permitted in ACI 301, Section 7.5.

3.2.2.6 Place nonshrink grout where shown on the Drawings and in accordance with manufacturer's recommendations.

3.2.2.7 Weather conditions: Protect concrete during placement in accordance with ACI 301, Section 8.4. Cold weather concreting shall be in accordance with approved procedure.

3.2.2.8 Construction joints: Make in accordance with ACI 301, Section 6.1, and as detailed on the Drawings. Sawcut in accordance with ACI 301, Section 11.5 or use embed in accordance with ACI 301, Sections 6.4 and 6.5.

3.2.2.9 Embedded items: Install in accordance with ACI 301, Sections 6.4 and 6.5.

3.2.2.10 Expansion joints: Locate as shown on the Drawings and construct with premolded filler and sealant.

3.2.2.11 Contraction joints: Locate as shown on the drawings. Sawcut in accordance with ACI 301, Section 11.5 or use embed in accordance with ACI 301, Sections 6.4 and 6.5.

3.2.2.12 Placing concrete against earth: Place on or against firm, damp surfaces free of frost, ice and free water. Do not place until required com-paction has been obtained. Dampen earth surfaces to receive fresh concrete.

3.2.2.13 Consolidation: Consolidate concrete slabs in accordance with ACI 301, Section 11.6.

3.2.3 Concrete Repair and Form Removal

3.2.3.1 Remove forms in accordance with ACI 301, Section 4.5.

3.2.3.2 Cut back form ties and examine concrete surfaces for defects. Repair only after permission for patching is given by KEH.

3.2.3.3 Place concrete repair mortar within 1 hour after mixing. Do not retemper mortar.

3.2.3.4 Surface defect repair: Repair in accordance with ACI 301, Sections 9.1, 9.2 and 9.3. Cure concrete repairs same as new concrete.

3.2.3.5 Repair of defects in concrete surfaces to be covered with special protective coating (SPC) shall be in accordance with SPC manufacturer's recommendations.

3.2.4 Concrete Finishes and Tolerances

3.2.4.1 Formed surfaces: Start finishing following concrete repair and complete within 96 hours after forms have been removed. Finish in accordance with sections of ACI 301 noted below.

- a. Surfaces exposed to earth backfill Section 10.2.1
- b. Interior surfaces Section 10.2.2

- c. Exterior surfaces exposed to weather Section 10.2.2
- d. Related unformed surfaces Section 10.5
- e. Surfaces to receive special protective coating Section 10.3.2

3.2.4.2 Unformed surfaces: Finish in accordance with sections of ACI 301 noted below:

- a. Interior floors Section 11.7.3
- b. Exterior equipment slabs Section 11.7.3
- c. Exterior slabs subject to foot traffic Section 11.7.4
- d. Surfaces to receive special protective coating Section 11.7.3

3.3 FIELD QUALITY CONTROL

3.3.1 Concrete Testing: Sampling and testing of concrete will be the responsibility of KEH. Concrete will be tested to ACI 301, Sections 16.3.4, 16.3.5, 16.3.6 and 16.3.8.

3.4 CURING AND PROTECTION

3.4.1 Curing

3.4.1.1 Cure concrete in accordance with ACI 301, Section 12.2. Clear curing compounds shall be tinted or applied surfaces marked to delineate extent of spraying.

3.4.1.2 Do not use curing compound on concrete surfaces to receive special protective coating. Cure in accordance with ACI 301, Section 12.2.1.2 or 12.2.1.5.

3.4.2 Protection

3.4.2.1 Protect concrete during extreme weather conditions in accordance with ACI 301, Section 12.3.

3.4.2.2 Protect concrete from mechanical injury in accordance with ACI 301, Section 12.4.

END OF SECTION

SECTION 05400
COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Iron and Steel Institute (AISI)
1986 Edition Specification for the Design of Cold-Formed Steel Structural Members

1.1.1.2 American Society for Testing and Materials (ASTM)
A 446-87 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
C 955-88 Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Track), and Bracing or Bridging, for Screw Application of Gypsum Board and Metal Plaster Bases

1.1.1.3 Industrial Fasteners Institute (IFI)
IFI-113 Steel Self-Drilling Tapping Screws

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Structural Studs and Runners: Meet the requirements of ASTM C 955. Structural properties computed in accordance with AISI Specification.

2.1.1.1 Studs: C-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade D, with minimum G 60 coating weight.

2.1.1.2 Runners: U-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade A, with G 60 coating weight.

2.1.2 Joists and Stringers: Structural properties computed in accordance with AISI Specification.

2.1.2.1 Joists: C-shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade D, with minimum G60 coating weight.

2.1.2.2 Stringers: Channel shaped, formed from 0.0635 inch galvanized steel sheet meeting the requirements of ASTM A 446, Grade A, with minimum G60 coating weight.

2.1.3 Screws: Meeting the requirements of IFI-113.

2.1.4 Fasteners and Accessories: Metal framing manufacturer's standard.

2.2 FABRICATION

2.2.1 Form members to manufacturer's standard shapes and meet the requirements of AISI Specification.

PART 3 - EXECUTION

3.1 ERECTION

3.1.1 Erect cold-formed metal framing in accordance with manufacturer's instructions.

3.1.2 Align runners accurately and anchor to floor, as shown on the Drawings. Install studs plumb, square and true to line and hold firmly in position with sufficient temporary bracing until permanently fastened in place. Do not splice studs.

3.1.3 Cut right angle connections of framing components to fit squarely against abutting members.

3.1.4 Connect members together and provide bracings in accordance with AISI Specification.

END OF SECTION

SECTION 05500

METAL FABRICATIONS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society of Mechanical Engineers (ASME)

1986 Edition, w/Addenda
through Dec 1988

ASME Boiler and Pressure Vessel
Code

Section IX

Qualification Standard for
Welding and Brazing Procedures,
Welders, Brazers, and Welding
and Brazing Operators

1.1.1.2 American Society for Testing and Materials (ASTM)

A 36-88c

Standard Specification for
Structural Steel

A 53-88a

Standard Specification for
Pipe, Steel, Black and
Hot-Dipped, Zinc-Coated Welded
and Seamless

1.1.1.3 American Welding Society (AWS)

AWS D1.1-90

Structural Welding Code - Steel

1.1.1.4 Federal Specifications (FS)

RR-G-661E, Including
AMD 1

Grating, Metal, Bar Type
(Floor, Except For Naval
Vessels)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings for Gratings

1.2.1.1 Submit drawings showing overall dimensions, details, and direction of bearing bars in accordance with the Drawings. Include cutouts and banding of grating around obstructions.

1.2.1.2 Submit load/deflection tables to verify conformity with design values shown on the Drawings.

1.3 QUALITY ASSURANCE

1.3.1 Qualification of Welding Personnel and Procedures

1.3.1.1 Personnel and procedures for welding structural steel shall have been qualified in accordance with AWS D1.1 before welding. Qualification in accordance with ASME Section IX may be substituted for this requirement.

1.3.1.2 Maintain file of welding procedure specifications, procedure qualification records and welder performance qualification test results at site for review.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Deliver metal fabrications to project at time convenient for installation. If exposed to inclement weather, protect fabrications with paper, plastic or other weatherproof covering and store off ground.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Rolled Steel Shapes, Plates and Bars: ASTM A 36.

2.1.2 Steel Pipe: ASTM A 53 (black), standard weight, Schedule 40.

2.1.3 Fasteners

2.1.3.1 Expansion anchors: Kwik-Bolt II manufactured by Hilti Fastening Systems.

2.1.3.2 Weld studs: Nelson Stud Welding Company Type H4L.

2.1.4 Metal Grating: Meeting the requirements of FS RR-G-661, Type I, Class 1, Material S, hot-dip galvanized. Grating shall be plain surface type with end banding bars, size shown on the Drawings. Provide manufacturer's standard clips for attachment to framing.

2.1.5 Nonshrink Grout: See Section 03300.

2.2 FABRICATION

2.2.1 General

2.2.1.1 Verify measurements and take field measurements necessary before fabrication. Provide miscellaneous bolts and anchors, supports, braces and connections necessary for completion of metal fabrications. Cut, reinforce, drill and tap metal fabrications shown to receive finish hardware and similar items. Weld or bolt connections as shown on the Drawings.

2.2.1.2 Workmanship: Form metal fabrications to shape and size, with sharp lines, angles, and true curves. Drilling and punching shall produce clean, true lines and surfaces. Execute and finish work in accordance with fabrication drawings.

2.2.1.3 Jointing and intersections: Accurately made, tightly fitted and in true planes with adequate fastenings.

2.2.1.4 Perform welding of steel connections in accordance with AWS D1.1, using E70XX electrodes. Perform visual weld examination in accordance with AWS D1.1, Paragraph 6.5.5, and document results. The Contractor shall examine the work to make certain the requirements of AWS D1.1, Section 3 and Paragraph 8.15 are met.

2.2.2 Miscellaneous Steel Items: Supply required clips, frames, equipment supports, and other fabrications shown on the Drawings. Fabricate parts from standard structural sections or shapes, to sizes required. Wherever miscellaneous parts are exposed, grind edges, corners, and rough cuts smooth and free of snags. Shop paint parts except those to be embedded in concrete or masonry, or those which require other specific finishes.

2.2.3 Finishes

2.2.3.1 Prime ferrous metal in accordance with Section 09900. Do not coat members to be embedded in concrete or masonry, surfaces and edges to be field welded, or items to be galvanized.

2.2.3.2 Zinc-rich coating: Galvicon MZP metallic zinc paint or ZRC zinc rich coating.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine areas where metal fabrications are to be installed and notify KEH in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in manner compatible with requirements for installation. Furnish setting drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, to be embedded in concrete or masonry construction. Coordinate with KEH for delivery of items to site.

3.2 INSTALLATION

3.2.1 Install metal fabrications plumb, level or as shown on the Drawings.

3.2.2 Make field connections as neatly as possible with joints flush and smooth. Grind smooth exposed field welds and polish before field painting. Repair welds in galvanized work with 2 coats of zinc-rich coating.

3.2.3 After installation has been approved, clean and paint connections with primer. Touch-up shop prime coat wherever damaged. Repair breaks in galvanized coatings with zinc-rich coating.

END OF SECTION

SECTION 07200

INSULATION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

C 665-86

Standard Specification for
Mineral-Fiber Blanket Thermal
Insulation for Light Frame
Construction and Manufactured
Housing

1.1.1.2 Underwriters Laboratories, Inc (UL)

1989

Building Materials Directory

1.2 SUBMITTALS: Not Used

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in original sealed containers or packages bearing manufacturer's name and brand designation. Where materials are covered by referenced specification, containers or packages shall bear specification number, type, and class as applicable.

1.3.2 Store and handle materials in manner to protect from damage during entire construction period.

1.3.3 Store insulation off ground and under cover to protect against weather, moisture, and physical damage.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Blanket Insulation: Mineral fiber insulation meeting the requirements of ASTM C 665. Insulation containing asbestos will not be acceptable. Insulation shall be UL listed and have "flame spread" and "fuel contributed" of 25, and "smoke developed" of 50 or less.

2.1.1.1 Wall insulation: Type III mineral fiber blankets with minimum thermal resistance of R-11 and faced with aluminum foil vapor barrier covering on one side. Insulation shall be capable of fitting into available space without compressing more than 10 percent in thickness.

2.1.1.2 Roof insulation: Type III mineral fiber blankets with minimum thermal resistance of R-19 and faced with aluminum foil vapor barrier covering on 1 side.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Blanket Insulation

3.1.1.1 Fire riser room: Completely insulate space between framing members or furring strips. Fit snugly into framing spaces leaving no voids. At exterior walls and in roof spaces install with vapor barrier toward interior side of construction. Fasten flanges to metal studs with mechanical fasteners or adhesive recommended by insulation manufacturer. Support insulation installed horizontally with No. 9 wire spaced at 2 feet maximum.

3.1.1.2 Install continuous behind electrical outlets. Fit around electrical conduits, pipes and other protruding objects. When water pipes occur in exterior wall or ceiling construction, apply insulation between pipe and cold side of wall or ceiling.

3.1.1.3 Cut to fit angles, corners, or irregular spaces, forming flange of vapor barrier for fastening to framing. Seal joints or breaks in vapor barrier.

END OF SECTION

SECTION 07400

PREFORMED ROOFING AND CLADDING/SIDING

PART 1 - GENERAL

1.1 REFERENCED STANDARDS AND SPECIFICATIONS: The following standards and specifications, including documents referenced therein, form a part of this specification to the extent designated herein.

1.1.1 American Society for Testing and Materials (ASTM)

A 446-87 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality

A 525-87 Standard Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process

1.2 SUBMITTALS: Refer to section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit fabricator erection drawings. Include a description of the sheet materials, fastening devices and sealants to be supplied, the quantity of each type of material, and the layout of each area to be covered with the siding. Details shall show panel capability of meeting exact overall building dimensions and assembly from exterior inward, from inside the building, to avoid assembly interference with nearby buildings, elevated steam lines, and the stack.

1.2.2 Color Samples: Submit manufacturer's standard colors for roof, walls, liners, and trim. Colors used on project will be selected by KEH.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Apply plastic protection film to preformed surfaces before delivery.

1.3.2 Store materials at site in dry place away from excess moisture, uncured concrete, cement, lime or strong chemicals.

PART 2 - PRODUCTS

2.1 METAL ROOFING AND CLADDING/SIDING PANELS

2.1.1 Prefinished Steel

2.1.1.1 Sheet steel stock: ASTM A 446, zinc-coated (galvanized) to ASTM A 525, G90. Factory color finished.

2.1.1.2 Minimum thickness: 0.0217 inch (80,000 psi yield).

2.1.1.3 Roof and walls: Panels shall be 3 foot wide with 4 major corrugations 1-1/2 inches high, 12 inches on center with 2 minor corrugations between each of the major corrugations the entire length of the panel; Butler II panels.

2.1.2 See Section 13120 for design loads and criteria.

2.2 METAL LINER PANELS

2.2.1 Prefinished Steel

2.2.1.1 Panels: ASTM A 446, zinc-coated (galvanized) to ASTM A 525, G60. Factory color finished.

2.2.1.2 Minimum thickness: 0.0187 inch.

2.2.1.3 Walls and ceiling: Nestable corrugated metal liner, 36 inches wide by 9/16 inch deep. Panels shall extend from floor to ceiling and serve as finished ceiling. See Drawings for locations.

a. Provide matching metal trim at interior and exterior corners, and around wall and ceiling openings.

2.2.1.4 Metal wall framing: See Section 05400.

2.3 INSULATION: See Section 07200.

2.4 METAL TRIM AND ACCESSORIES

2.4.1 Metal closure strips, top, base, head, sill and jamb or corner trims shall be the same material, gage, and finish as the siding.

2.4.2 Eave flashing, trim, ridge caps, ridge channel and similar metal accessories shall be same material, gage and finish as adjacent wall or roof covering.

2.4.3 Gable Trim: 0.0217 inch galvanized steel with factory applied color coating. Design and size shall be similar to Contour Gable Trim by Butler Manufacturing Company.

2.4.4 Gutter and Downspout Fabrication

2.4.4.1 Fabricate of same material and finish as wall metal.

2.4.4.2 Form gutters and downspout to collect and remove water flow from roof resulting from rain falling at rate of 3 inches per hour for 5 minute duration.

2.5 CLOSURES AND SEALANTS

2.5.1 Closure Strips: Manufacturer's standard, formed compressed rubber, synthetic rubber, bituminous impregnated materials, or metal of same

type as roof and wall panels. Closure strips shall be formed to match corrugations of roofing or siding.

2.5.2 Sealant: Nonstaining type, elastomeric, manufacturer's standard.

2.6 FASTENERS

2.6.1 Roofing and Siding Panels: Manufacturer's standard type, finished to match adjacent surface when exterior exposed.

2.6.2 Metal Wall Liner and Ceiling Liner: Self-drilling screws, cadmium plated stainless steel, furnished with color coated heads.

2.7 FINISH

2.7.1 Precoated enamel on steel with color selected from manufacturer's standards by KEH.

2.7.2 Coating materials containing lead will not be acceptable.

PART 3 - EXECUTION

3.1 METAL ROOFING, SIDING, AND LINER PANELS

3.1.1 Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

3.1.2 Fasten cladding system to structural supports, aligned, level and plumb.

3.1.3 Install sealant and gasket to prevent weather penetration.

3.1.4 System: Free of rattles, noise due to thermal movement, and wind whistles.

3.2 METAL TRIM AND CLOSURES

3.2.1 Utilize trim and closures with metal siding installations as shown on fabricator's drawings.

3.2.2 Protect trim with prefinished surfaces from damage in the same manner siding is protected.

3.2.3 Attach gutters and downspouts to building. Install gutters to provide drainage.

3.3 CONNECTORS

3.3.1 Space sheet fasteners in accordance with manufacturer's recommendations.

3.3.2 Install self-tapping hex-head or slotted pan-head screws with power tools.

3.4 INSULATION: Except as otherwise shown on the Drawings or approved, install insulation against covering and between supporting members to present neat appearance. Blanket insulation shall have facing at joints lapped and fastened to provide tight joints.

3.5 WALL LINER: Fasten wall liner into place to present neat appearance.

3.6 FIELD PAINTING: Upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with same material used for shop coat. Shop-primed ferrous surfaces exposed on outside of building and shop-primed surfaces of doors shall be painted with 2 coats of approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with manufacturer's recommended touch-up paint.

END OF SECTION

SECTION 07600

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

A 527-85	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
B 32-89	Standard Specification for Solder Metal

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit fabrication and erection drawings of sheet metal work. Include half size or full size details of sections.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Store sheet metal off ground and protected from damage.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Sheet Metal: Galvanized sheet steel, coating class G90, meeting the requirements of ASTM A 527, 0.0276 inch minimum.

2.1.2 Solder: 50 percent tin, 50 percent lead meeting the requirements of ASTM B 32.

PART 3 - EXECUTION

3.1 FABRICATION

3.1.1 General

3.1.1.1 Form sheet metal accurately to profiles shown on the Drawings, free of buckles and waves.

3.1.1.2 Hem exposed edges 1/2 inch.

3.1.1.3 Make provision in fabrication for expansion and contraction.

3.1.1.4 Clean and flux metals before soldering. Sweat solder completely through seam width.

3.1.1.5 Neutralize excess flux, as work progresses, with 5 to 10 percent washing soda solution, and rinse thoroughly.

3.1.1.6 Back paint sheet metal with primer in accordance with Section 09900.

3.2 INSTALLATION

3.2.1 Verify surfaces to receive sheet metal are clean and smooth and blocking has been installed.

3.2.2 Install sheet metal watertight, without waves, warps, buckles, fastening stresses or distortion.

END OF SECTION

SECTION 07920

SEALANTS AND CALKING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 994-71 (1982)

Standard Specification for
Preformed Expansion Joint
Filler for Concrete (Bituminous
Type)

ASTM C 920 (1987)

Standard Specification for
Elastomeric Joint Sealants

1.1.1.2 Federal Specifications (FS)

TT-S-00227E,
Including AMD 3

Sealing Compound: Elastomeric
Type, Multicomponent (For
Caulking, Sealing, And Glazing
In Buildings And Other
Structures)

TT-S-00230C,
Including AMD 2

Sealing Compound: Elastomeric
Type, Single Component (For
Caulking, Sealing, And Glazing
In Buildings And Other
Structures)

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Manufacturer's Installation Instructions: Include manufacturer's instructions for cleaning, priming, and application of sealants for each material condition of application along with products supplied.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in manufacturer's original containers, unopened and labels intact.

1.3.2 Store and handle materials to prevent inclusion of foreign materials or exposure to temperatures exceeding 90 F.

1.3.3 Do not bring materials onto site with shelf lives that will expire before scheduled use.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 General: Container labels shall show name of material, date of manufacture, mixing instructions, shelf life, and curing time.

2.1.2 Sealants

2.1.2.1 Exterior building sealant: One component polyurethane: Nonsag type meeting the requirements of FS TT-S-00230, Type II.

2.1.2.2 Interior building and sheet metal sealant: One component polysulfide sealant: Nonsag type meeting requirements of FS TT-S-00230, Type II.

2.1.2.3 Interior concrete joints: Sealant shall meet the requirements of ASTM C 920, Type M, Grade P, Class 25, USE T. Sealant shall be protective coating compatible, and be recommended by the Special Protective Coating manufacturer. See Section 09805.

2.1.3 Primer: Nonstaining type, as recommended by manufacturer of sealant compound for intended service.

2.1.4 Expansion Joint Filler: Similar to Watson Bowman & Acme Corporation "W" Series, or bituminous type meeting the requirements of ASTM D 994.

2.1.5 Backer Rod: Closed-cell polyethylene foam rod.

2.1.6 Bond Breaker Tape: Polyethylene tape with pressure sensitive adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Clean joints to be sealed of dirt, dust, oil, grease, mortar, and other foreign materials.

3.1.2 Follow recommendations of manufacturer of sealing materials for each condition of application.

3.1.3 Remove loose particles with wire brush. Blow out joints with oil-free and moisture-free compressed air. Remove wax or oil with methyl ethyl ketone or xylol.

3.2 INSTALLATION

3.2.1 Primer

3.2.1.1 Prime joints when and as recommended by sealant manufacturer for each condition of application.

3.2.1.2 Do not apply primer to concrete until concrete has cured at least 28 days.

3.2.2 Back-Up

3.2.2.1 Install backer rod in joints where polysulfide and polyurethane sealant is to be applied. Install with proper tool, in accordance with manufacturer's instructions and to correct depth for sealant shape specified. Where depth of joint is not sufficient for installation of backer rod, use bond-breaker tape to prevent 3 point adhesion.

3.2.2.2 Install bond-breaker tape over expansion joint filler, in joints where polyurethane sealant is to be applied.

3.2.3 Joint Dimensions: As shown on Drawing or as recommended by sealant manufacturer. Otherwise make depth of sealant joints 1/2 of joint width, except that minimum joint size shall be 1/4 inch by 1/4 inch.

3.2.4 Sealant

3.2.4.1 Perform sealing work using specified materials and proper tools in accordance with manufacturer's recommendations for conditions of each application.

3.2.4.2 Use polyurethane sealant in joints of concrete floors and walkways. For other sealant applications, use 1 component polysulfide.

3.2.4.3 Apply polysulfide sealant to sheet metal joints.

3.2.4.4 Apply sealant to clean and dry joints only.

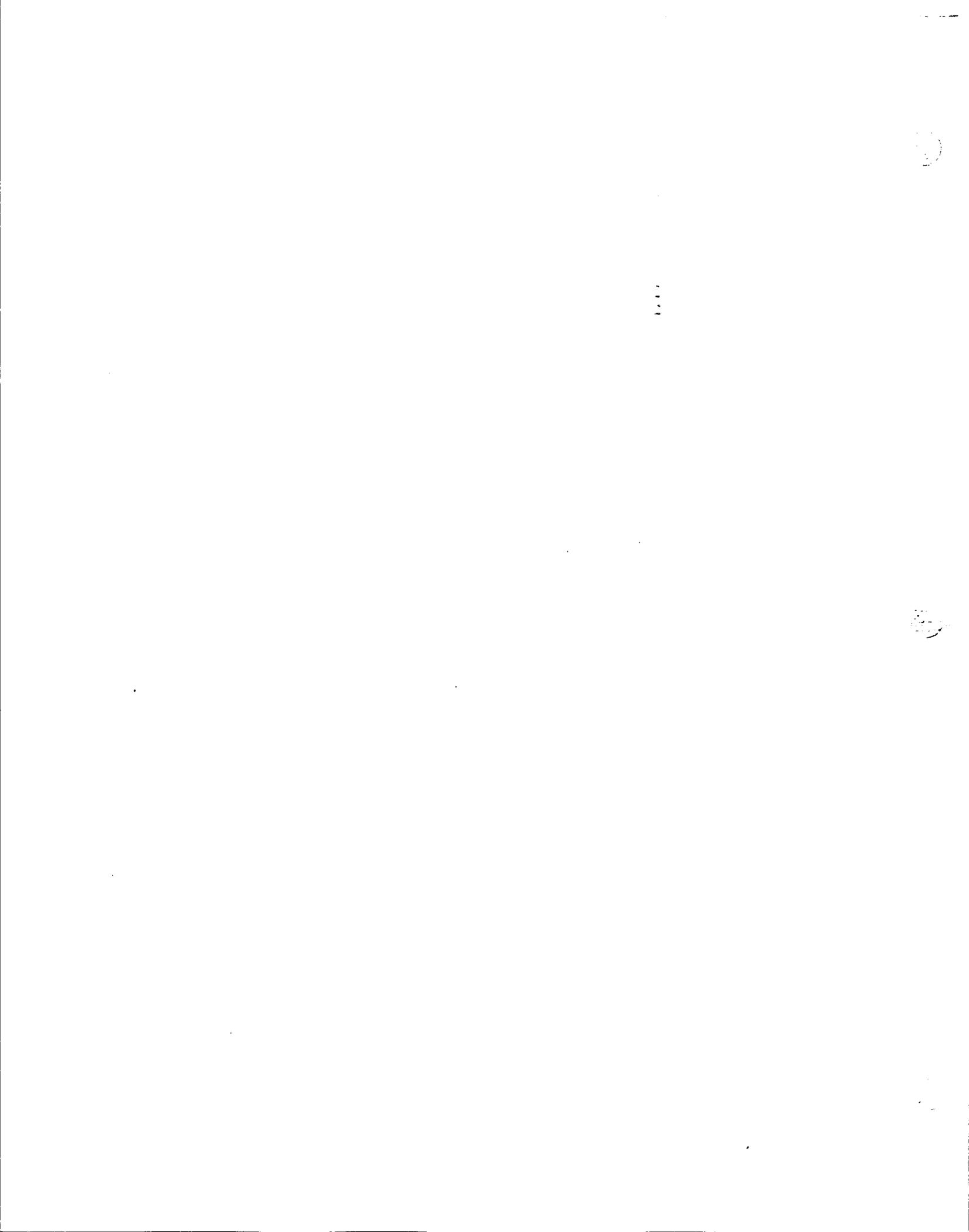
3.2.4.5 Do not apply sealants when ambient temperature is below 40 F or above 100 F.

3.2.4.6 Apply sealing materials with guns having proper size nozzles and using sufficient pressure to fill spaces and voids solid. Where use of gun is impractical, proper hand tools, as approved, may be used.

3.2.4.7 Tool sealant after installation as required to properly fill joint and produce smooth surface.

3.2.4.8 Take necessary precautions to prevent contact of sealants with adjacent surfaces. If necessary, apply masking tape in continuous strips in alignment with edge of joint. Remove masking tape after joints have been tooled.

END OF SECTION



SECTION 08100
METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

A 115 (1982) Steel Door Preparation Standards

A 156.16-1989 American National Standard for Auxiliary Hardware

1.1.1.2 American Society for Testing and Materials (ASTM)

A 366-85 Standard Specification for Steel, Sheet, Carbon, Cold-Rolled Commercial Quality

A 569-85 Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality

1.1.1.3 Steel Door Institute Specification (SDI)

100 Standard Steel Doors and Frames Selection and Usage

108 Guide for Standard Steel Doors

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit Drawings showing size, elevations and location of each door and frame. Include location and details of hardware reinforcement, and frame anchors.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver to site in undamaged condition.

1.3.2 Store above ground and under cover.

1.3.3 Clean abraded or rusty areas and touch up with same primer used for shop finish.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Hollow Metal Doors: Full-flush type doors, 1-3/4 inch thick, with no seams or joints on face, and meet the requirements of SDI 100 and SDI 108.

2.1.1.1 See Drawings for types and sizes.

2.1.1.2 Fabricate from 18 gage minimum annealed and leveled ASTM A 366 or ASTM A 569 steel.

2.1.1.3 Doors reinforced with 1 of following.

a. Steel members welded in place with spaces filled with insulation. See Drawings for insulated door locations.

b. Water resistant honeycomb core bonded to both faces.

2.1.1.4 Fabricate with 1/8 inch maximum clearance from frames.

2.1.1.5 Doors prepared for the installation of lockset, bolts, closers, latch sets, strikes, and mortised for template hinges shall comply with the ANSI A 115 series where applicable.

2.1.1.6 Reinforce for hinges with 10 gage minimum steel, for closers with 12 gage minimum steel, and for locks with 14 gage minimum steel. Reinforcement drilled and tapped as required for attachment of hardware.

2.1.1.7 Surface welds ground smooth.

2.1.1.8 Glazing stop on exterior side of doors shall be nonremovable.

2.1.2 Pressed Metal Frames

2.1.2.1 See Drawings for profiles and dimensions.

2.1.2.2 Fabricate from 16 gage annealed and leveled ASTM A 366 or ASTM A 569 steel.

2.1.2.3 Corners mitered, welded and ground smooth.

2.1.2.4 Three 18 gage wall anchors and 1 floor anchor for each jamb.

2.1.2.5 Temporary spreader attached to bottom of each frame.

2.1.2.6 Reinforce for hinges with 10 gage minimum steel, and for strikes and closers with 12 gage minimum steel. Reinforcement drilled and tapped as required for attachment of hardware.

2.1.2.7 Door Silencers: Furnish 3 rubber door silencers for door frames, L03011 in accordance with ANSI A 156.16.

2.1.3 Shop Finish: Doors and frames bonderized and painted with 1 coat of manufacturer's standard, baked-on, rust inhibitive primer. Primer containing lead will not be acceptable.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Leave temporary spreaders in place until frames are attached to wall framing.

3.1.2 Install frames with jambs plumb and head level.

3.1.3 Install frames for glazed openings where scheduled.

3.1.4 Attach frames to wall framing. Align anchors with hinges and door strike.

3.1.5 Install doors in conjunction with application of hardware, and with uniform clearance at head and jambs. Leave in smooth operating condition.

END OF SECTION

SECTION 08332
OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Referenced Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

A 526-85	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Commercial Quality
----------	--

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Fabricator Drawings: Submit drawings showing each type and location of doors. Describe features of construction and show installation details.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver to site in undamaged condition.

1.3.2 Store above ground and under cover.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Overhead Coiling Doors: Similar to SFN1 manufactured by Overhead Door Corporation.

2.1.1.1 Doors electric power operated (208V, 3 phase, 60 Hz) with auxiliary chain-gear operation. Interlock shall prevent motor operation when chain hoist is engaged.

2.1.1.2 Size doors, including components, to resist wind load of 20 psf. Minimum size of components given in manufacturer's published specifications.

2.1.1.3 Form curtain of interlocking steel flat-faced slats. Form slats from copper bearing steel sheets, galvanize in accordance with ASTM A 526, 1.25 ounce zinc per square foot, and phosphatize. Slats shall be Type F-265 flat crown, pitch 2-5/8 inches, with a crown depth of 5/8 inch (minimum 0.0336 inch).

2.1.1.4 Bottom of curtain shall consist of 2 rolled steel angles fastened, back to back, to slats. Equip bottom with safety edge of

continuous rubber seal, providing automatic emergency reversing of travel if object in doorway is contacted by safety edge.

2.1.1.5 Door curtain shall coil onto 4 inch minimum steel pipe designed for not more than 0.03 inch deflection per foot of door width. Support pipe on ball bearings and equip with adjustable, counterbalancing, helical springs.

2.1.1.6 Equip guides with double weatherstripping.

2.1.1.7 Cover coiled door with hood formed from 0.0276 inch minimum steel sheet, galvanized in accordance with ASTM A 526. Hood shall be supplied with internal, neoprene baffle and lintel weatherseal to retard air infiltration.

2.1.1.8 Give metal surfaces 1 coat minimum of manufacturer's standard, rust-inhibiting primer.

2.1.1.9 Equip doors with locking devices, suitable for padlocking.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Install in accordance with the Drawings and approved submittals.

3.1.2 Attach door securely to structure.

3.1.3 At completion, adjust as required for door to operate freely.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI A156.1-1981	American National Standard for Butts and Hinges
ANSI A156.2-1983	American National Standard for Bored and Preassembled Locks and Latches
ANSI A156.4-1980	American National Standard for Door Controls--Closers
ANSI A156.16-1989	American National Standard for Auxiliary Hardware
ANSI A156.18-1984	American National Standard for Materials and Finishes

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Hardware List: Submit complete hardware list. List hardware for each door separately under door number and hardware requirement.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Packing and Marking: Pack each item of hardware separately, with necessary fasteners and instructions. Mark each item with hardware number shown in hardware list.

1.3.2 Protect hardware from damage before, during, and after installation.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Specific Requirements: See hardware schedule at end of this Section.

2.1.2 Manufacturers' Catalog Numbers: Catalog numbers in hardware schedule refer to following manufacturers.

2.1.2.1 Door hinges: ANSI A156.1, types and sizes shown in schedule, with nonremovable pins on exterior doors. Similar to Stanley.

2.1.2.2 Locksets and latchsets: ANSI A156.2, Series 4000, Grade 1, Type shown in schedule. Similar to Schlage heavy duty.

2.1.2.3 Door closers: ANSI A156.4, type and size shown in schedule. Similar to Corbin.

2.1.2.4 Auxiliary hardware: ANSI A156.16, type shown in schedule. Similar to Builders Brass Works Corp.

2.1.2.5 Weatherstripping, door bottoms and thresholds: Similar to Pemko.

2.1.3 Fasteners: Furnish necessary screws, bolts, and other fasteners of suitable size and type to anchor hardware in position. Match hardware finish. Furnish with expansion shields, toggle bolts, and other appropriate anchors.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Verify installation and be responsible for fit of hardware in locations specified.

3.2 ADJUSTING AND CLEANING

3.2.1 Remove protective coverings and clean hardware before completion of project. Leave hardware in smooth operating condition. Deliver keys to KEH.

3.3 HARDWARE SCHEDULE

Hardware Group No.	Hardware	Quantity	Hardware Type	ANSI A156.18 Finish
Group #1	Hinges	1-1/2 Pr	Butts, FBB 168 4-1/2 x 4-1/2	652
	Lockset	1	D-53PD 70 PLY (without core)	626
	Closer	1	K120	SBL
	Threshold	1	172 A 36"	---
	Automatic Door Bottom	1	430 CR 36"	---
	Weatherstripping	1 Set	319 CN	---
	Door Stop	1	F-121 X	626

Group #2	Hinges	1-1/2 Pr	Butts, FBB 168, 4-1/2 x 4-1/2	652
	Closer	1	K120	SBL
	Lockset	1	D-53 PD 70 PLY (without core)	626
	Threshold	1	172A 36"	---
	Weatherstripping	1 set	319 CN	---
	Door Stop	1	F-121 X	626
	Automatic Door Bottom	1	430 CR 36"	---

3.4 FIELD QUALITY CONTROL: Notify KEH in accordance with Section 01400.

END OF SECTION

SECTION 08800

GLAZING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

C 1048-88 Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass

1.1.1.2 Consumer Product Safety Commission (CPSC)

Code of Federal Regulations
Title 16, Commercial Practices
Chapter II, Consumer Products Safety Commission

Part 1201 Safety Standards for Architectural Glazing Materials

1.1.1.3 Federal Specifications (FS)

TT-S-00230C, Sealing Compound: Elastomeric Type, Single Component (For Including AMD 2 Calking, Sealing, And Glazing In Buildings And Other Structures)

1.1.1.4 International Conference of Building Officials (ICBO)

1988 Edition Uniform Building Code (UBC)

1.2 SUBMITTALS: Not Used

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Glass

2.1.1.1 Tempered: Label to show compliance with CPSC Part 1201, Category I or Category II.

a. Clear tempered: Float meeting the requirements of ASTM C 1048, Kind FT, Condition A, Type I, Class 1.

2.1.2 Glazing

2.1.2.1 Setting blocks: 80 durometer neoprene equal to thickness of glass and long enough to limit load on each block to 15 psi. Minimum length of setting blocks, 3 inches.

2.1.2.2 Gasket: Preformed elastomeric material molded or extruded in form of strips, channels or other shapes designed to provide 4 to 10 pounds per linear inch of sealing pressure and possessing following properties.

Tensile strength	2000 psi, min
Elongation at rupture	175%, min
Tear resistance	120 lb/lin in., min
Hardness, Durometer (Shore A scale)	75 ± 5
Compression set	35%, max 22 hrs at 212 F
Brittleness temperature	-40 F, min

a. Use 40 pound density closed-cell neoprene sponge gasket in combination with full-density wedge gasket meeting the requirements of above material for dry set glazing on metal channel frames.

2.1.2.3 Sealant: One part silicone construction sealant meeting the requirements of FS TT-S-00230.

2.1.2.4 Tape: Preformed sealant, usually butyl-polyisobutylene, with or without shims or spacers, designed for use in compression glazing in conjunction with bulk sealant and gaskets and possessing properties of sealant.

2.1.2.5 Color of tape and sealant shall match color of frame.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Install glass in accordance with the Drawings, approved submittals, and CPSC Part 1201, Chapter II.

3.1.2 Install tempered glass with tong marks at bottom of lite.

3.2 ADJUSTING AND CLEANING

3.2.1 At completion of work, remove glazing compound from window assembly, remove labels and paint from glass, then clean and polish glass.

END OF SECTION

SECTION 09805

SPECIAL PROTECTIVE COATING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 4259-88 Standard Practice for Abrading Concrete

D 4260-88 Standard Practice for Acid Etching Concrete

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Vendor Information: Submit information listed in column 5 of the Vendor Information List in this Section.

1.2.2 List of Materials: Submit complete list of materials, colors and location to be used, to substantiate compliance with the Drawings and this Section. List shall enumerate percentage of volatile and nonvolatile materials and percentage of component parts of each type of material.

1.2.3 Certificate of Compatibility: Submit letter stating that, for the intended use (including joint designs), coatings are compatible with the sealants listed in Section 07920.

1.2.4 Crew Certification: Submit documentation attesting that the application crew has been certified by the manufacturer to apply the selected coating system.

1.2.5 Application Instructions: Submit manufacturer's detailed application instructions, including application equipment required, coating thickness, and standard joint procedures.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to site in manufacturer's unopened containers with labels intact. Do not open containers or remove labels until after inspection and acceptance by KEH.

1.3.2 Store materials in accordance with manufacturer's recommendations and in well ventilated area not exposed to excessive heat, sparks, flame or direct rays of sun.

1.4 PROJECT CONDITIONS

1.4.1 Environment for Coating: Coat exterior surfaces only when ambient and surface temperatures are within the manufacturer's recommended range, and temperature is 5 F above dewpoint. Apply coatings only when substrate temperatures are falling, unless prior written approval has been obtained from KEH.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Surface Conditioner: 100 percent solids, trowelable epoxy mastic such as Wall-NV Trowelable by Steelcote or approved substitute.

2.1.2 Primer: Two-component epoxy sealer such as Epo-Lux 121 by Steelcote or approved substitute.

2.1.3 Finish coat: 100 percent solids epoxy such as Colortop by Steelcote or approved substitute.

2.1.4 Joint Sealers: Manufacturers standard products compatible with the coating system and meeting the requirements of Section 07920.

2.1.5 Surface conditioner, primer and finish coating materials shall be products of the same manufacturer.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive coating for conditions that will adversely affect execution, permanence or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 General: Before application, sweep and dust space or area to receive coating.

3.2.2 Pre-Priming: Clean concrete surfaces of laitance, oil, stains, dust, and other foreign material.

3.2.2.1 Clean concrete with uniform application of 1 of following.

- a. Abrasive blast in accordance with ASTM D 4259.
- b. Acid etch in accordance with ASTM D 4260.

3.2.2.2 If acid etch is used, rinse thoroughly with clean water when solution ceases to foam and scrub with stiff bristle brush. Allow treated area to thoroughly dry. Scratches, cracks, holes, and abrasions shall be cut back to proper key and filled with surface conditioner.

3.2.2.3 Allow concrete to cure 28 days before coating is applied.

3.2.3 Post Priming

3.2.3.1 Feather abrasions, chips, skips and holidays occurring in prime coat by sanding and recoat with material and color to minimum dry film thickness specified.

3.2.3.2 Previously coated surfaces shall be recoated only after existing film is completely dry.

3.2.3.3 Protect coating from rain until dry to touch.

3.2.4 Protection

3.2.4.1 Provide and install drop cloths, shields and other protective devices required to protect surfaces adjacent to areas being coated. Keep spatter, smears, droppings and over-run of coating materials to minimum and remove as coating work progresses.

3.2.4.2 Remove and store electrical fixtures, outlets and switch plates, mechanical diffusers, escutcheons, surface hardware, fittings and fastenings before starting work. Clean and reinstall upon completion of work in each area. Use no solvent or abrasives to clean hardware that will remove lacquer finish normally used on some items.

3.3 APPLICATION

3.3.1 Apply coating materials in accordance with manufacturer's recommendations.

3.3.2 Apply with equipment recommended by manufacturer.

3.3.3 Joints: Prepare and treat joints in accordance with manufacturer's standard procedures, Section 07920, and the Drawings.

3.4 FIELD QUALITY CONTROL

3.4.1 Inspection: KEH will perform tests to ascertain that coating materials have been applied in accordance with this Section.

3.5 CLEANING

3.5.1 Furnish and maintain at site, closed metal containers for disposal of waste materials. Place materials spotted or soaked with paint, oil or solvents in containers.

3.5.2 Brushes, rollers, spatulas and spray equipment shall be thoroughly cleaned after each use and shall contain no oils, thinners or other residue after such cleaning.

3.5.3 Remove empty cans from site at end of each shift.

3.5.4 At completion of coating work, remove materials, containers, rags, cloths, brushes, and other equipment from site. Clean up spills.

3.6 COATING SCHEDULE

	<u>Minimum Wet Film Thickness</u>	<u>Minimum Dry Film Thickness</u>
3.6.1 Concrete (Interior of Buildings 2403WB, WC, and WD)		
Prime Coats:		
Epo-Lux 121	NA	NA
Hi-Build (78 Series)	7 mils	5 mils
Amerlock 400 wc	6.4 mils	5 mils
Finish Coats:		
Colortop	10 mils	10 mils
Hi-Build (78 Series)	7 mils	5 mils
Amershield	7 mils	5 mils

3.6.2 Where coating thickness can not be verified, a visual inspection of the surface shall be performed to verify complete coverage.

VENDOR INFORMATION LIST
 ("X" Indicates Required Data)

Project No W-016H-C3		VENDOR INFORMATION (VI)															
Project Title RMW Storage Facility		1	2	3	4	5	Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Instructions			Spare Parts List	Data Sheets	Illustrative Cuts
Specification Section 09805												Installation	Operation	Maintenance			
EPN IDENTIFICATION	DESCRIPTION	REFERENCE DRAWING	SPECIFICATION PARAGRAPH	Dimensional Drawings	Equipment Weights	Specifications	Certified Test Data	Circuit or Control Diagram	Installation	Operation	Maintenance	Spare Parts List	Data Sheets	Illustrative Cuts			
1	Surface Conditioner		2.1.1	X					X								
2	Primer		2.1.2	X					X								
3	Finish Coat		2.1.3	X					X								
4	Joint Sealers		2.1.4	X					X								
END OF SECTION																	

SECTION 09900

PAINTING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American Society for Testing and Materials (ASTM)

D 16-84 Standard Definitions of Terms
Relating to Paint, Varnish,
Lacquer, and Related Products

1.1.1.2 Federal Specifications (FS)

SS-S-1996 Sealer, Water And Weather
Resistant, For Asphalt,
Concrete, And Masonry Surfaces

TT-E-489H Enamel, Alkyd, Gloss, Low VOC
Content

TT-E-509C Enamel, Odorless, Alkyd,
Interior, Semigloss, White
And Tints

TT-P-641G, Primer Coating; Zinc
Including AMD 1 Dust-Zinc Oxide (For Galvanized
Surfaces)

TT-P-645A Primer, Paint, Zinc Chromate,
Alkyd Type

1.1.1.3 Federal Standard (FED STD)

FED-STD-595A, Including Colors
CHGS NOT 1, 2, 3, 4, 5, 6,
7, 8 And 9

1.1.1.4 Military Specification (MS)

DOD-P-15328D, Primer (Wash), Pretreatment
Including AMD 1 (Formula No. 117 For Metals)

1.1.1.5 Steel Structures Painting Council (SSPC)

Surface Preparation Specifications

SSPC-SP 1-82 No. 1 Solvent Cleaning

SSPC-SP 2-82

No. 2 Hand Tool Cleaning

SSPC-SP 3-82

No. 3 Power Tool Cleaning

SSPC-Paint 27-82

Basic Zinc Chromate-Vinyl
Butyral Wash Primer

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 List of Materials: Submit list including manufacturer's names, specifications and other data necessary to show compliance with requirements.

1.2.2 Color Samples: Colors will be selected by KEH. Submit samples in form of 3 inch by 5 inch color chips. Describe coating material and color identification on reverse face of each chip. Retain approved samples for use as quality standard of final finishes.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to jobsite in sealed, original, labeled containers each bearing manufacturer's name, type of paint, brand name, color designation, and instructions for mixing and reducing.

1.3.2 Store materials at minimum ambient temperature of 45 F in well ventilated and heated area or areas.

1.3.3 Take precautions to prevent fire hazards and spontaneous combustion.

1.4 PROJECT CONDITIONS

1.4.1 Environmental Requirements

1.4.1.1 Temperature

a. Unless otherwise recommended by paint manufacturer, apply coatings when ambient and surface temperatures are between 45 F and 95 F except water-thinned paints and other special coatings. Apply water-thinned paints when ambient and surface temperature is between 50 F and 90 F.

b. Should temporary heat be required, provide until specified surface and air temperatures exist for required time period. Maintain temporary heat for 24 hours after paint and finish application.

1.4.1.2 Weather

a. Do no exterior work on unprotected surfaces if it is raining or moisture from other source is present or expected before applied paints can dry or attain proper cure without damage.

b. Allow wet surfaces to dry and attain required temperatures and conditions specified before proceeding with work or continuation of previously started work.

c. Do not apply finish in areas where dust is being generated.

1.4.1.3 Ventilation: Provide adequate continuous ventilation required for drying various materials as recommended by paint manufacturer.

1.4.1.4 Illumination: Do not proceed with work unless minimum lighting level of 15 footcandles is provided on surfaces to be painted or finished. Provide temporary lighting to attain lighting level specified.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Terms used are defined in ASTM D 16.

2.1.2 Sealers

2.1.2.1 Concrete floor, interior, Building 2403WB, WC, and WD: Refer to Section 09805.

2.1.2.2 Exterior concrete ramps and fire riser room floor, clear: FS SS-S-1996.

2.1.3 Pretreatment Wash for Metals: MS DOD-P-15328.

2.1.4 Primers

2.1.4.1 Zinc chromate: FS TT-P-645, (alkyd type). Tint with lamp black to produce color other than yellow.

2.1.4.2 Zinc dust-zinc oxide: FS TT-P-641, Type II.

2.1.5 Paints

2.1.5.1 Gloss enamel, exterior and interior: FS TT-E-489, Class A.

2.1.5.2 Semigloss enamel, interior: FS TT-E-509.

2.1.6 Other Materials: Materials not specifically described but required to achieve specified finishes shall be of high quality and of manufacture approved by KEH.

2.1.7 Hazardous Material Restrictions

2.1.7.1 Lead: Do not use paint that contains more than 0.06 percent lead by weight in total nonvolatile content of paint.

2.1.7.2 Mercury: Do not use mercurial fungicides in exterior oil paints.

2.1.8 Colors and Tints: Paint manufacturer's standard colors and tints.

PART 3 - EXECUTION

3.1 INSPECTION

3.1.1 Examine surfaces scheduled to receive paint and finishes for conditions that will adversely affect execution, permanence, or quality of work and which cannot be put into acceptable condition through preparatory work included in Article 3.2.1.

3.1.2 Report in writing to KEH conditions that may potentially affect proper application of finish. Do not commence surface preparation or coating application until defects have been corrected and conditions are made suitable.

3.2 PREPARATION

3.2.1 New Surfaces

3.2.1.1 Surfaces to be coated shall be in proper condition to accept and assure proper adhesion of coating system.

3.2.1.2 Ferrous metals

a. For shop primed surfaces, apply phosphoric acid etch solution at field welded or abraded spots and let set for time recommended by acid etch manufacturer, rinse with potable water, and when dry, apply prime coat. Wash primed surfaces free of dirt, oil, and grease.

b. Prepare ferrous metals in accordance with SSPC-SP 2 Hand Tool Cleaning and/or SSPC-SP 3 Power Tool Cleaning. Mill scale may be present on cleaned surface providing it is fully anchored, gives metallic appearance and does not cover more than 30 percent of surface. Prime ferrous metals within four hours after preparation.

3.2.1.3 Galvanized and nonferrous metals: Solvent clean in accordance with SSPC-SP 1 and treat with vinyl type wash coat meeting the requirements of SSPC-Paint 27.

3.2.1.4 Concrete Floors

a. Allow at least 14 days after forms are removed before starting work unless otherwise approved by KEH. Remove dirt, scale, powder, laitance, oil and grease, by washing with trisodium phosphate solution, rinse with potable water and let dry.

b. Verify exact type and manufacture of form oil or release agents used and remove in accordance with written recommendation of manufacturer. Where pH alkalinity reading is above 8-1/2, use zinc sulphate.

c. Remove contamination, dirt, dust, and foreign matter on concrete floors. Apply acid etch solution, rinse with clear water, then let dry. After surface treatment, keep traffic off surface until painted.

3.2.2 Mixing and Thinning

3.2.2.1 General: Packaged paint may be thinned before application where necessary to suit conditions of surface, temperature, weather, and method of application. Follow manufacturer's written instructions for thinning packaged paint. Use of thinner shall not relieve Contractor from obtaining complete hiding. Do not mix paints of different manufacturers.

3.2.2.2 Pretreatment wash: Mix by adding one volume of acid component to four volumes of resin component. Add acid component slowly to resin component with constant stirring. Use within eight hours. Material may be reduced with normal butyl alcohol or 99 percent isopropyl alcohol if thinning is required to maintain wet spray.

3.2.3 Protection

3.2.3.1 Cover or otherwise protect finished work of other trades, surfaces not to be painted, or surfaces not concurrently being painted.

3.2.3.2 Provide sufficient drop cloths, shields, and protective equipment to prevent spray or drippings from fouling surfaces not being painted, including surfaces in paint storage and preparation areas.

3.2.3.3 Place cotton waste, cloths, and materials which may constitute fire hazard in closed metal containers and remove daily from jobsite.

3.2.3.4 Where toxic materials, and both toxic and explosive solvents are used, take appropriate precautions in accordance with manufacturer's written instructions and applicable safety regulatory agencies. In applying acid etch coating or solutions to metals, concrete, plaster, and toxic materials to copper, provide ventilation and take protective measures to meet requirements of safety regulatory agencies.

3.3 APPLICATION

3.3.1 Surfaces to be Painted and Finished: Paint surfaces scheduled or shown. Finish factory-primed materials in accordance with this Section.

3.3.2 General: Paint may be applied by brush, roller, or spray unless otherwise specified. At time of application, paint shall show no signs of deterioration. Maintain uniform suspension of pigments during application.

3.3.2.1 Apply paint so finished surfaces are free of runs, drops, ridges, waves, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Apply each coat as film of uniform thickness. Use rollers of type designed for coating to be applied and surface to be coated. Ensure that surfaces including edges, corners, crevices, welds, and rivets receive film thickness equivalent to adjacent painted surfaces.

3.3.2.2 Touch up suction spots or make overall application of primer or sealer on first coat on gypsum wallboard and other surfaces to produce uniform color and gloss.

3.3.2.3 Touch up concrete sealer coats to eliminate dull spots. Wipe off excess sealer after each application.

3.3.3 Coating Progress: Allow time between successive coats to permit proper drying. Modify drying times to suit abnormal environmental conditions. Oil base or oleoresinous solvent type paints are ready for recoating when paint feels firm, does not deform or feel sticky under moderate pressure of thumb, and application of another coat of paint does not cause lifting or loss of adhesion of undercoat.

3.3.4 Time Between Surface Preparation and Painting: Apply first coat on surfaces that have been cleaned, pretreated, and otherwise prepared for painting as soon as practicable after such pretreatment has been completed, but before deterioration of prepared surface.

3.3.5 Pretreatment Wash Coat: Apply vinyl type wash coat by brush or spray. Maintain wet spray at all times.

3.4 CLEANING

3.4.1 At completion of each day, remove painting materials, empty containers, rags, cloths, brushes, or other equipment. Store or dispose of as appropriate.

3.4.2 As work proceeds and upon completion, promptly remove paint where spilled, splashed, or spattered.

3.4.3 At conclusion of work, leave premises neat and clean to satisfaction of KEH.

3.5 PAINTING AND FINISH SCHEDULE

	<u>Minimum Dry Film</u>
3.5.1 Exterior and Interior	
3.5.1.1 Ferrous Metal, Enamel, Gloss	
Pretreatment: MS DOD-P-15328	0.5 mil
Prime Coat: FS TT-P-645	1.5 mils
2nd Coat: FS TT-E-489, Class A	1.5 mils
Finish: FS TT-E-489, Class A	1.5 mils
3.5.1.2 Galvanized Metal, Enamel, Gloss	
Pretreatment: MS DOD-P-15328	0.5 mil
Prime Coat: FS TT-P-641, Type II	1.5 mils
2nd Coat: FS TT-E-489, Class A	1.5 mils
Finish: FS TT-E-489, Class A	1.5 mils
3.5.1.3 Overhead Coiling and Metal Doors	
See Paragraph 3.5.2.2 (Interior)	
3.5.2 Interior	
3.5.2.1 Ferrous Metal, Enamel, Semigloss	
Pretreatment: MS DOD-P-15328	0.5 mil
Prime Coat: FS TT-P-645	1.5 mils

2nd Coat: FS TT-E-509 1.5 mils
Finish: FS TT-E-509 1.5 mils

NOTE: Preprimed pre-engineered building steel bents shall be touched up only - no finish coats shall be required.

3.5.2.2 Metal Doors and Frames and Overhead Coiling Doors, Enamel, Semigloss

Prime Coat: By Door Manufacturer 1.5 mils
2nd Coat: FS TT-E-509 1.5 mils
Finish: FS TT-E-509 1.5 mils
(Interior and Exterior)

3.5.3 Use products of same manufacturer within coating system.

3.6 COLOR SCHEDULE: Colors shall be as follows:

3.6.1 Miscellaneous Steel Framing: Match prime coat to existing primed components of metal building.

3.6.2 Hollow Metal Doors and Frames: Products of PPG.

3.6.2.1 Doors: Specify door color to match building color. Submit color for KEH approval.

3.6.2.2 Frames: Product of PPG. Blue; submit color to KEH for approval.

3.6.3 Overhead Coiling Doors: Specify door color to match building color, submit color for KEH approval.

3.6.4 Interior Perimeter Steel Base Plate: Prime to match existing primed components of metal building.

3.6.5 Sprinkler System: Red, No. 21105 in accordance with FED-STD-595.

3.6.6 Where paint is scheduled, but color is not specifically called out in the above Schedule, the surface shall match surround areas.

END OF SECTION

SECTION 10440

INTERIOR SIGNS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: Not applicable

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Manufacturer's Data: Submit a complete manufacturer's catalog cut of exit signs. Show details of installations.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Deliver materials to the site in original sealed containers or packages bearing the manufacturer's name and brand designation.

1.3.2 Store and handle materials in a manner to protect them from damage during the entire construction period.

PART 2 - PRODUCTS

2.1 EXIT SIGN: Self-powered wall-mounting unit with 6 inch high, 3/4 inch stroke, green letters on white background. Sign shall be illuminated by sealed tritium gas tubes coated internally with phosphor. Unit shall be capable of 12 years maintenance-free continuous operation. Similar to Self-Powered Lighting, Inc No. 710A-1-WG-S.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Exit signs shall be installed at locations shown on the Drawings. Signs shall be installed plumb and true, at the indicated mounting heights.

3.2 ANCHORAGE

3.2.1 Anchorage shall be in accordance with the manufacturer's recommendation.

END OF SECTION

SECTION 13120
PRE-ENGINEERED STRUCTURES

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

- 1.1.1.1 American Institute of Steel Construction, Inc (AISC)
AISC M011-1980 Manual of Steel Construction,
8th Edition
- 1.1.1.2 American Iron and Steel Institute (AISI)
1986 Edition Specification for the Design of
Cold-Formed Steel Structural
Members
- 1.1.1.3 American National Standards Institute (ANSI)
ANSI A58.1-1982 American National Standard
Minimum Design Loads for
Buildings and Other Structures
- 1.1.1.4 American Society for Testing and Materials (ASTM)
A 446-87 Standard Specification for
Steel Sheet, Zinc-Coated
(Galvanized) by the Hot-Dip
Process, Structural (Physical)
Quality
A 525-87 Standard Specification for
General Requirements for Steel
Sheet, Zinc-Coated (Galvanized)
by the Hot-Dip Process
- 1.1.1.5 American Welding Society (AWS)
AWS D1.1-90 Structural Welding Code - Steel
- 1.1.1.6 International Conference of Building Officials (ICBO)
1988 Edition Uniform Building Code (UBC)
- 1.1.1.7 Metal Building Manufacturers Association (MBMA)
1986 Edition Low Rise Building Systems
Manual

1.1.1.8 Lawrence Livermore National Laboratory (LLNL)

UCRL-15910
June 1990

Design and Evaluation
Guidelines for Department
of Energy Facilities
Subjected to Natural
Phenomena Hazards

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Erection Instructions and Diagrams: Submit documents necessary to erect buildings and install components, including the following.

1.2.1.1 Anchor bolt layouts, sizes, and other design details.

1.2.1.2 Structural connections.

1.2.1.3 Roofing and siding connections.

1.2.1.4 Joint sealing and caulking.

1.2.1.5 Door frame installation.

1.2.1.6 Flashings.

1.2.1.7 Accessory installation.

1.2.1.8 Details and instructions necessary for assembly.

1.2.1.9 Fabrication drawings necessary to supplement instructions and diagrams.

1.2.2 Certificates of Conformance or Compliance: Fabrication drawings, including anchor bolt layouts and sizes, shall be accompanied by stress values, design calculations, and certificate signed by registered professional structural engineer, stating design criteria and procedures used and attesting to adequacy and accuracy of design.

1.2.3 Color Samples: Colors used on Project will be selected by KEH. Submit samples from manufacturer's standard.

1.3 SYSTEM DESCRIPTION

1.3.1 Metal Building: Multiple-span structure, rigid frame beam and column type.

1.3.1.1 Primary framing: Rigid frame of rafter beams and columns, intermediate columns, braced end frames, end wall columns, and wind bracing or roof and wall panels braced and tied.

1.3.1.2 Secondary framing: Purlins, girts, eave struts, flange bracing, sill supports, clips and other items required for complete installation.

1.3.1.3 Wall and roof system: Preformed metal panels of vertical profile, and accessory components.

1.3.2 Design Criteria: Design building and components in accordance with applicable sections of AISC M011, MBMA "Metal Building Systems Manual", AISI "Specification for the Design of Cold-Formed Steel Structural Members", and UBC.

1.3.2.1 Basic design shall include live, dead, snow, wind, and seismic loads. Other design loads, either static or dynamic, shall be considered auxiliary loads.

1.3.2.2 Vertical live and snow loads: Design roof for dead load plus 20 psf uniformly distributed live and dead loads.

1.3.2.3 Wind loads: Design in accordance with ANSI A58.1, Section 6, using following criteria.

- a. Basic wind speed: 70 mph.
- b. Importance factor: 1.07
- c. Exposure category: C.

1.3.2.4 Seismic loads: Design in accordance with UCRL-15910, Section 4.2.2.

1.3.2.5 Auxiliary loads

a. Design roof framing for additional load of 10 psf to accommodate loads imposed on building from piping, lighting fixtures, and equipment, including automatic fire sprinkler system. Provide method for fastening equipment to roof.

b. Magnitude, quantity, and location of auxiliary loads shown on the Drawings or described in this Section.

1.3.2.6 Maximum deflection in roofing or roof panels shall not exceed 1/180th of spans, and maximum deflection in siding or wall panels shall not exceed 1/90th of spans.

1.3.2.7 Provide drainage to exterior for water entering or condensation occurring within cladding system.

1.3.2.8 Install building completely weathertight, free of abrasions, loose fasteners, and deformations.

1.3.2.9 Weld steel in accordance with AWS D1.1, Section 1 through 8.

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Deliver, store, handle, and erect prefabricated components, panels, and other manufactured items in manner that will not damage or deform.

1.4.2 Examine sheets and panels upon arrival at site and, if found to be wet, remove moisture, restack, and protect until used. Replace damaged or defaced components unless they can be repaired to satisfaction of KEH.

1.4.3 Stack materials stored at site before erection on platforms or pallets and cover with tarpaulins or other suitable weathertight covering.

1.4.4 Store metal sheets or panels so water which may have accumulated during transit or storage will drain off.

1.4.5 Do not store sheets or panels in contact with materials that may cause staining.

1.5 WARRANTY

1.5.1 Building shall be warranted against water leaks arising out of or caused by ordinary wear and tear by elements for period of 5 years. Warranty shall start upon final acceptance of Work or date Operating Contractor takes possession, whichever is earlier.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Wall and Roof Systems

a. Sheet steel stock: ASTM A 446 zinc-coated (galvanized) to ASTM A 525, G90. Factory color finished.

b. Wall system: 0.0217 inch (26 gage), exposed fastening panels.

c. Roof system: 0.0276 inch (24 gage), exposed fastening panels.

d. Sealant: Manufacturer's standard elastomeric, nonstaining type.

e. Fasteners: Manufacturer's standard type, finished to match adjacent surface when exterior exposed.

2.1.2 Accessories

a. Flashing, trim, caps, and similar metal accessories shall be of same thickness, material and finish used for adjacent wall or roof coverings.

b. Gutter and downspout fabrication:

1) Fabricate of same material and finish as wall metal.

2) Form gutters and downspout to collect and remove water flow from roof resulting from rain falling at rate of 3 inches per hour for 5 minute duration.

c. Closure strips: Formed of compressed rubber, synthetic rubber, bituminous impregnated materials, or metal of same respective type as roof and wall panels, and standard with manufacturer. Molded closure strips shall be free of open voids and shall not absorb or retain water. Closure strips shall be formed to match corrugations or configurations of

roofing or siding being used, and provided where shown and necessary for weathertight construction.

d. Louver and vents: See Section 15500.

e. Non-shrink grout: See Section 03300.

2.1.3 Finish: Precoated enamel on steel with color selected from manufacturer's standards by KEH.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Erect in accordance with manufacturer's approved erection instructions and diagrams.

3.1.2 Set structural elements on nonshrink grout specified in Section 03300.

3.1.3 Insulate dissimilar materials, not compatible when in contact, from each other by gaskets or insulating compounds.

3.1.4 Wall and Roof Systems

3.1.4.1 Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

3.1.4.2 Fasten cladding system to structural supports, aligned level and plumb.

3.1.4.3 Use exposed fasteners for roof system and exposed or concealed fasteners for wall system.

3.1.4.4 Install sealant and gasket to prevent weather penetration.

3.1.4.5 System: Free of rattles, noise due to thermal movement, and wind whistles.

3.1.5 Attach gutters and downspouts to building. Install gutters to provide drainage.

3.1.6 Attach louvers and ventilators to supporting construction to assure rain-tight installation.

3.1.7 Field Painting: Upon detection, abraded or corroded spots on shop-painted surfaces shall be wire brushed and touched up with same material used for shop coat. Shop-primed ferrous surfaces exposed on outside of building and shop-primed surfaces of doors shall be painted with 2 coats of approved exterior enamel. Factory color finished surfaces shall be touched up as necessary with manufacturer's recommended touch-up paint.

3.2 FIELD QUALITY CONTROL

3.2.1 Inspect final installation for compliance with this Section and approved submittals. Inspection shall include verification of materials and configuration in accordance with approved submittals. Ensure that fasteners are installed and tightened in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 15300
FIRE PROTECTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI B31.1-1989 Edition	American National Standard Code for Pressure Piping - Power Piping
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1.1.1.2 American Welding Society (AWS)

AWS D1.1-90	Structural Welding Code - Steel
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1.1.1.3 Factory Mutual System (FM)

1990 Edition	Approval Guide
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1.1.1.4 Federal Standards (FED STD)

FED-STD-595A, Including CHGS NOT 1, 2, 3, 4, 5, 6, 7, 8, And 9	Colors
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1.1.1.5 International Conference of Building Officials (ICBO)

1988 Edition	Uniform Building Code (UBC)
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1.1.1.6 National Fire Protection Association (NFPA)

NFPA 13	Standard for the Installation of Sprinkler Systems, 1989 Edition
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1.1.1.7 Underwriters Laboratories, Inc (UL)

1990	Fire Protection Equipment Directory
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1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

1.2.3 Design/Fabricator Drawings: Submit design, fabrication and installation drawings of automatic dry pipe sprinkler systems. Design in accordance with NFPA 13 for ordinary hazard occupancy classification. Size system in accordance with pipe Schedule in NFPA 13, Section 8-3. Include applicable requirements of NFPA 13, Article 1-9 and this Section.

1.2.3.1 Identify proposed deviations from specified materials or design requirements in writing.

1.2.3.2 Design shall be reviewed and approved by a Washington State licensed professional fire protection engineer to verify that the design complies with the requirements of NFPA 13 and the construction specifications. The submitted design drawings shall bear the engineers professional stamp.

1.2.3.3 Identify location of hangers, supports, and sway braces on design drawing. Provide details of hanger, support, and sway brace assemblies, to identify the assembly components used, including material type, sizes, and manufacturer's name, model, or figure number, as applicable. Include on the design drawing sufficient detail of attachment of assembly to building structure, showing fastener type, size, material, and embedment depth where applicable.

1.2.4 Seismic Calculations: Submit detailed mathematical analysis verifying that design of attachments of hangers, supports, and sway braces to building structure meet the requirements of UBC, Zone 2B.

1.2.5 Record Drawings: Submit "as-installed" drawings of dry pipe sprinkler systems.

1.2.6 NFPA Test Certificate: Submit completed Contractor's Material and Test Certificate, in accordance with NFPA 13, Section 1-10.

1.3 SYSTEM DESCRIPTION

1.3.1 Design of the sprinkler system shall comply with the earthquake requirements of NFPA 13, Section 3-5.3 and associated NFPA 13, Appendix A references.

1.3.2 Each sprinkler system shall include a 6-inch dry pipe valve supplied with standard trim including automatic air maintenance compressor, fire department connection, flow alarm pressure switch, low air pressure supervisory switch, system main drain valve, water motor alarm gong, and valve house low temperature supervisory switch. The systems shall include all other appurtenances required by NFPA 13 and specified herein.

1.3.3 Components of sprinkler system, if not designated in this Section and the Drawings by manufacturer's name and model/figure number, shall be current products of manufacturer and UL listed or FM approved for use intended.

1.4 QUALITY ASSURANCE

1.4.1 Welding Documentation: Fabricator shall ensure that welders in his employ are qualified in accordance with AWS or ANSI requirements before

performing shop or field welding on structural steel components which are part of this Section. Welder qualification test results shall be made available upon request. Proposed AWS or ANSI welding procedures shall be subject to review.

1.4.2 Fabricator shall have a welding procedure and a quality assurance procedure prior to welding as required in NFPA 13, Paragraph 3-7.2.11.1 and 3-7.2.11.2.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Piping

2.1.1.1 Pipe and fittings: Meet the requirements of NFPA 13. Piping shall be steel with threaded or grooved type (rubber gasketed) fittings. Rubber gasketed fittings for use with plain end pipe shall not be used.

2.1.1.2 Rigid and flexible rubber gasketed couplings: Bolted sleeve type for use with grooved-end pipe, with rubber rings for sealing. Couplings and rubber rings shall be approved for use on dry pipe sprinkler systems.

2.1.2 Sealant: See Section 07920.

2.1.3 Paint: See Section 09900.

2.2 EQUIPMENT

2.2.1 Water Motor Alarm Gong: Weatherproof mechanical gong with hood, complete with drain and interconnecting piping.

2.2.2 The following equipment, designated by manufacturer or trade name, shall be supplied. No substitutions will be accepted.

2.2.3 Switches

2.2.3.1 Flow alarm pressure switch: Potter, Model PS10. Switches shall have pressure-actuated, normally-open contacts.

2.2.3.2 Low air pressure supervisory switch: Potter, Model PS40. An adjustable low air pressure supervisory switch with normally-closed contacts shall be installed on dry pipe sprinkler systems to annunciate a failure to maintain a proper air supply in the system.

2.2.3.3 Low temperature supervisory switch: Potter, Model RTS-G. A low temperature supervisory switch with normally-closed contacts shall be installed in sprinkler system valve houses to annunciate temperature drops within valve houses below 40 F.

2.2.4 Automatic Sprinklers: Nominal 1/2 inch diameter orifices, rated for high (286 F) temperature classification.

2.2.5 Air Compressor: Provide an air compressor for each of the dry pipe sprinkler systems. A 110 volt, single phase local power supply shall be provided to each valve house as shown on the Drawing.

2.2.6 Sprinkler Cabinet: Provide with required number of sprinkler heads of ratings and types installed, a sprinkler wrench, and locate adjacent to each system riser.

2.2.7 Fire Department Connection: Brass or bronze body and furnished with self-closing double clappers, plugs and chains, automatic ball-drip valve, and escutcheon plate. Connection shall be 4 inch IP by 2-1/2 inch HT by 2-1/2 inch HT. Hose threads shall be National Standard Fire Hose threads, 7-1/2 TPI.

2.2.8 Dry Pipe Valve: Reliable, with standard trim package.

PART 3 - EXECUTION

3.1 DESIGN REQUIREMENTS

3.1.1 Design 2 dry pipe sprinkler systems to provide complete sprinkler protection throughout the building in accordance with NFPA 13 for ordinary hazard occupancy classification. Locations of system risers are shown on the Drawing. Size of system risers shall be as specified herein.

3.1.2 The temperature classification for sprinklers located under the roof shall be rated high (286 F).

3.2 INSTALLATION

3.2.1 Install dry pipe sprinkler systems in accordance with NFPA 13 and as specified herein.

3.2.2 Coordinate requirements for interruption of existing services and Fire Department stand-by with KEH.

3.2.3 Protect new piping from damage by earthquake, by proper clearance around penetration holes, flexible couplings, and sway bracing, in accordance with NFPA 13, Sections 3-5.3 and associated portions of Appendix A.

3.2.4 Pack pipe penetrations through insulated walls with fiberglass or mineral wool packing and seal both sides with polysulfide sealant. Seal penetrations through uninsulated walls with polysulfide sealant.

3.2.5 Pipe Escutcheons: Install on sides of wall penetrations exposed to view.

3.2.6 Repair damaged surfaces. Refinish repaired or defaced surfaces to match adjacent undisturbed areas.

3.2.7 Terminate exterior discharge, inspectors test, and auxiliary drain lines with 45 degree elbows, turned down.

3.2.8 Provide suitable splash-pads, at exterior discharge locations, on other than paved surfaces.

3.2.9 Paint new system piping exposed to weather conditions on outside of building in accordance with Section 09900. Finish color shall be red (No. 21105) shown in FED STD 595.

3.2.10 Welding

3.2.10.1 Limit onsite welding to fabrication of supports or braces, if necessary. No other on site welding will be permitted.

3.2.10.2 Perform shop welding of piping and attachments to pressure retaining components in accordance with ANSI B31.1 and NFPA 13.

3.2.10.3 Perform welding of steel structural elements in accordance with AWS D1.1, Sections 1 through 8.

3.2.10.4 Do not perform welding or flame cutting on or within building without written approval of KEH.

3.2.10.5 Perform visual weld examination in accordance with AWS D1.1 paragraphs 6.5.5 and 8.15, or ANSI B31.1 paragraph 136.4.2 as applicable.

3.2.10.6 Perform dye penetrant weld examination on cover pass of tie-in welds, not to be hydrostatically tested, in accordance with ANSI B31.1 paragraph 136.4.4.

3.2.11 Hangers and Supports

3.2.11.1 Hang, support and brace sprinkler system piping from building structural steel members, or to metal supports attached to building structure in accordance with NFPA 13.

3.2.11.2 Use clamping devices when attaching hangers to structural steel. When clamping is impracticable, obtain written authority to weld, punch, drill or cut structural steel members to provide attachment. C-type clamps shall not be used to attach sway braces to building structure (See NFPA 13, Paragraph 3-5.3.5.10).

3.2.11.3 When required, deliver to KEH detailed mathematical analysis, by registered professional engineer, of structural integrity where questionable alterations of building structural components are proposed such as punching or drilling. Analysis may also be required where obvious deformations of structural members are caused by hanging sprinkler piping.

3.2.12 Signs: Permanent type identification signs shall be installed at control, drain, test, and alarm valves. Legend shall include warning of Fire Department response to operation of valve.

3.3 FIELD QUALITY CONTROL

3.3.1 Flushing and Testing

3.3.1.1 General

a. Furnish equipment and instruments required to perform flushing and testing operations described below.

b. Conduct flushing and testing operations while witnessed by KEH.

c. Remove and replace pieces of apparatus, material, or work which fails in flushing or testing operations and retest.

d. Repair damage resulting from flushing or testing to satisfaction of KEH.

3.3.1.2 Flushing: Flush new sprinkler system piping as described below.

a. Flush sprinkler piping by feeding water into system through alarm valve to provide velocity of at least 7 feet per second in piping being flushed.

b. Discharge flushing water from end of cross mains.

c. Discharge flushing water to point designated by KEH. Flushing shall continue until effluent runs clear and free of foreign matter.

d. Provide documented evidence that flushing has been accomplished in accordance with this Section. Deliver to KEH before testing.

3.3.1.3 Hydrostatic test

a. Hydrostatically test new sprinkler system in accordance with NFPA 13, Section 1-11.2.

b. Use hydrostatic test pressure of 200 psi.

c. Leaks in piping will not be acceptable.

3.3.1.4 Dry pipe system tests: Test in accordance with NFPA 13, Section 1-11.3.

Project No W-016H-C3

APPROVAL DATA LIST

("X" Indicates Required Data)

Project Title RMW Storage Facility

Specification Section 15300

1	2	3	4	5								6			
				EPN IDENTIFICATION	DESCRIPTION	REFERENCE DRAWING	SPECIFICATION PARAGRAPH	Dimensional Drawings	Equipment Weights	Specifications	Material Description		Performance Data	Circuit or Control Diagrams	Data Sheets
1	Dry Pipe Valves		2.2.8									X			Including all trim
2	Water Motor Alarm Gongs		2.2.1									X			
3	Fire Department Connections (FDC)		2.2.7									X			
4	Check Valve for FDC		1.3.1									X			
5	Flow Alarm Pressure Switches		2.2.3.1									X			
6	Low Air Pressure Supervisory Switches		2.2.3.2									X			
7	Low Temperature Supervisory Switches		2.2.3.3									X			
8	Sprinkler Heads		2.2.4										X		
9	Rubber Gasketed Rigid and Flexible Couplings		2.1.1.1										X		
10	Air Compressor		2.2.5												

SECTION 15500

HEATING, VENTILATING AND AIR CONDITIONING

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 Air Movement and Control Association, Inc (AMCA)

AMCA Standard 210-85 Laboratory Methods of Testing Fans for Rating Purposes

1.1.1.2 American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

52-76 ASHRAE Standard Method of Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter

1.1.1.3 American Society for Testing and Materials (ASTM)

A 307-88a Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

A 563-88a Standard Specification for Carbon and Alloy Steel Nuts

1.1.1.4 Sheet Metal and Air Conditioning Contractors National Association, Inc (SMACNA)

1983, 1st Edition HVAC Systems--Testing, Adjusting and Balancing

1.1.1.5 Underwriters Laboratories, Inc (UL)

1989 Building Materials Directory

1.2 SUBMITTALS: Refer to section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

1.2.3 Test Data: Submit documentation of test data, dated and signed by contractor executing test.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Fasteners: ASTM A 307, Grade A or B bolts, with heavy hex nuts meeting the requirements of ASTM A 563, UNC threads, bolt head marking not required. Finish to be cadmium plating or electro-galvanizing.

2.2 EQUIPMENT

2.2.1 Wall Exhausters: Units shall be 5 horsepower, 21,680 cfm for Building 2403 WD, and 3 horsepower, 13,340 cfm for Buildings 2403 WC and 2403 WB at .40 inches static pressure, equipped with OSHA approved drive and inlet guard, and gravity damper. Units shall be belt-driven type, minimum of 2 belts. The motor pulley shall be adjustable for final system balancing. A disconnect switch shall be factory installed and wired from the fan motor to the disconnect junction box. Motors shall be equipped with over-current protection box. Units shall bear the AMCA 210 certified performance seal for air performance. Unit wiring shall be 480 volt, 3 phase, 60 hertz. Similar to ACME Propmaster Model K48N for Building WD, and K36M for Buildings WC and WB.

2.2.2 Louvers: Units shall be flanged for flush surface application. Jams shall be constructed with integral downspouts for carrying water from the blades to the louver sill. Screens shall be provided on the interior surface of the louvers and shall be 1/2 inch mesh. Louvers shall be constructed of extruded aluminum with anodized finish with 1 coat of lacquer. Louvers shall be 48 inches by 72 inches, passing 8672 cfm for Building WB, and 6670 cfm for Buildings WC and WD with less than 0.15 inch wg static pressure drop. Similar to American Warming and Ventilating, Inc, Model LE-33.

2.2.3 Baseboard Heater: Units shall be suitable for 120 volts, single-phase, 60 hertz. Heater output shall be 1000 watts. Baseboard length shall be 48 inches. Similar to Chromalox, Model BBF-41. Provide Integral thermostat, similar to Model BBFK-7. Unit shall be UL listed.

2.2.4 Dampers: Units shall be automatic closing gravity type, rear flanged, sized to fit wall exhauster support steel. Screens shall be provided on the interior surface of the dampers and shall be 1/2 inch galvanized mesh.

2.2.5 40 Percent ASHRAE-Rated Filters: Initial average filtering efficiency of 40 to 45 percent, when tested in accordance with ASHRAE 52, having UL Class II listing. Size, 24- by 24- by 12-inch. Filters to be complete with steel holding frames and retainers.

PART 3 - EXECUTION

3.1 INSTALLATION

3.1.1 Equipment

3.1.1.1 Install where shown on the Drawings in accordance with manufacturer's instructions.

3.1.1.2 Install filters after construction has been completed and debris removed.

3.2 FIELD QUALITY CONTROL

3.2.1 Testing HVAC Systems

3.2.1.1 After system is installed, place exhaust fans in operation in accordance with manufacturer's instructions. After fans have been in operation for at least 4 hours, test the HVAC systems in accordance with SMACNA Testing, Adjusting and Balancing publication, and under surveillance of KEH.

3.2.1.2 Furnish instruments, materials and labor required to perform testing of systems. Instruments shall have been calibrated by approved testing laboratory with date of calibration marked on them.

3.2.1.3 Do not use instruments which are part of system for testing. Check instruments of system against test instruments.

3.2.1.4 Data to be recorded

a. Record vibration of fan shaft along with testing data for each system specified, except unit heaters, by SMACNA.

b. After test has been performed, submit Test Data report in accordance with Paragraph 1.2.3. Test data shall be tabulated and submitted with flow sheet indicating points of measurement. Include characteristics of systems that were observed during tests. Include failure of system and control components to meet operational functions required by the Drawings and this Section.

3.2.1.5 Testing sequence: Perform in accordance with sequence given by SMACNA.

SECTION 16400

SERVICE AND DISTRIBUTION

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

1.1.1.1 American National Standards Institute (ANSI)

ANSI C80.1-1983 American National Standard for Rigid Steel Conduit--Zinc Coated

ANSI C82.1-1985 American National Standard Specifications for Fluorescent Lamp Ballasts

1.1.1.2 American Society for Testing and Materials (ASTM)

A 475-78 (1984) Standard Specification for Zinc-Coated Steel Wire Strand

1.1.1.3 Federal Specifications (FS)

W-C-375B, Including Notice 1 Circuit Breakers, Molded Case; Branch Circuit And Service

W-F-406D Fittings For Cable, Power, Electrical And Conduit, Metal, Flexible

W-C-1094A Conduit and Conduit Fittings Plastic Rigid

W-P-115B Panel, Power Distribution

W-S-896E, Including AMD 2 and Notice 1 Switches, Toggle (Toggle And Locks), Flush Mounted (General Specification)

WW-C-566C Conduit, Metal, Flexible

1.1.1.4 National Electrical Manufacturers Association (NEMA)

Standards Publication/ No. FB 1-1988 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies

Standards Publication/
No. ICS 2-1988

Standards for Industrial
Control Devices, Controllers,
and Assemblies

Standards Publication/
No. ICS 6-1988

Enclosures for Industrial
Controls and Systems

Standards Publication/
No. PB 1-1984

Panelboards

Standards Publication/
No. ST 20-1986

Dry-Type Transformers for
General Applications

Standards Publication/
No. WD 1-1989

General Requirements for Wiring
Devices

1.1.1.5 National Fire Protection Association (NFPA)

NFPA 70

National Electrical Code,
1990 Edition

1.1.1.6 Underwriters Laboratories, Inc (UL)

1989

Electrical Appliance and
Utilization Equipment Directory

1989

Electrical Construction
Materials Directory

UL 797-1977

Standard for Electrical
Metallic Tubing

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by Underwriters Laboratories, Inc (UL) in the Electrical Appliance and Utilization Equipment Directory or Electrical Construction Materials Directory, and bear listing mark of laboratory. In absence of mark, submit documentation of applicable listing. Listing and marking by UL is not required for products specified to meet the requirements of a national standard, or designated by manufacturer's part number on the Drawings or in this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Solderless Connectors and Terminal Lugs: Pressure type, rated for use with copper or aluminum conductors with insulating caps or covers rated for system utilization voltage. Connectors shall be types specified below.

2.1.3.2 Conductor No. 10 and smaller shall be solid; No. 8 and larger shall be stranded.

2.1.3.3 Conductor identification: Voltage levels, grounded conductors, equipment grounding conductors, and ungrounded phase conductors shall be identified. Existing field center wire color-code systems shall be used. If no present field center wire color code exists, the following color-coding system shall be used:

a. Color coding for 240/120-volt, single-phase systems:

- 1) Grounded neutral white.
- 2) Grounding conductor green or bare.
- 3) Ungrounded conductor black.
- 4) Ungrounded conductor red.

b. Color coding for 208Y/120 volt, 3-phase systems:

- 1) Grounded neutral white.
- 2) Grounding conductor green or bare.
- 3) Phase A (ungrounded) conductor black.
- 4) Phase B (ungrounded) conductor red.
- 5) Phase C (ungrounded) conductor blue.

c. Color coding for 480Y/277 volt, 3-phase systems:

- 1) Grounding neutral gray.
- 2) Grounding conductor green or bare.
- 3) Phase A (ungrounded) conductor brown.
- 4) Phase B (ungrounded) conductor orange.
- 5) Phase C (ungrounded) conductor yellow.

2.1.4 Wiremarkers: Imprinted tubular plastic.

2.1.5 Nameplates: Laminated plastic stock, 1/16 inch thick, white surface with black core with beveled edges. Engraving shall be 1/4 inch minimum block style. The following is a list of nameplates required for each of the 3 buildings. (2403WB, WC, WD). (CAM ALARM TEST) (CAM ALARM PNL) (CAM 1) (CAM 2) (CAM 3) (CAM 4) (EXH FAN 1) (EXH FAN 2) (EXH FAN 3) (EXH FAN 4) (EXH FAN DISC 1) (EXH FAN DISC 2) (EXH FAN DISC 3) (EXH FAN DISC 4) (XFMR A) (SPEAKERS - PAGING SYS) (POWER PNLBD A) (LIGHT CONTACTOR).

2.1.6 Concrete and Masonry Anchors: Kwik-Bolt manufactured by Hilti Fastening Systems or Red Head Wedge Anchor manufactured by

Phillips Drill Company. Anchors to be minimum 3/8 inch diameter with a minimum 2-1/2 inch embedment depth.

2.1.7 Wire Pulling Compound: "Y-er Eas" manufactured by Electro Compound Company or Polywater manufactured by American Polywater Corporation.

2.1.8 Tape

2.1.8.1 Plastic insulating tape: Similar to Scotch No. 33+ manufactured by 3M Company.

2.1.8.2 Conduit protection tape: Similar to Scotchrap No. 50 manufactured by 3M Company.

2.1.9 Insulating Putty: "Scotchfil" manufactured by 3M Company, GE No. 8389 manufactured by General Electric Co, or "Airseal" manufactured by Kearney Company.

2.1.10 Duct Sealing Compound: "Sealex" manufactured by Porcelain Products Co or "Kerite" manufactured by Kerite Co.

2.1.11 Hangers for Individual Conduits: Factory made springable wrought steel clamps or malleable iron, split and hinged rings. For suspended conduit, clamps or rings shall be bolted to, or interlocked with threaded suspension rod.

2.1.12 Sealant: See Section 07920.

2.1.13 Grounding Systems

2.1.13.1 Conductors: Buried ground cable shall be 5/8 inch diameter, 7 strand, special low carbon grade steel with Class B zinc coating in accordance with ASTM A 475. Exposed bonding conductor shall be No. 6 bare solid copper minimum.

2.1.13.2 Ground rods: 5/8 inch diameter by 8'-0" long galvanized steel.

2.1.13.3 Ground connections shall be exothermally welded using appropriate molds and cartridges. Similar to Erico. Building column to ground grid may be with a Cadwld-type GL lug bolted to column with 1/2 inch diameter galvanized bolt.

2.1.13.4 Ground plates: 2-1/2 inch square with 4 tapped holes, 3/8-16 threads, 1/2 inch deep. Similar to Erico Products No. S-330.

2.1.13.5 Equipment grounding conductors shall be included in all raceways containing feeders, branch circuits, or control circuits of 120 volts or greater.

2.2 EQUIPMENT

2.2.1 Equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be Type 1, 3, or 3R.

2.2.2 Panelboards: Rating shown on panelboard schedule, UL labeled, and meeting the requirements of NFPA 70 (NEC), NEMA PB 1 and FS W-P-115. Flush or surface mounting as shown on panelboard schedule.

2.2.2.1 Provide with main circuit breaker.

2.2.2.2 Provide doors with flush-type combination catch and locks, keyed alike and furnished with 2 keys for each panelboard. Provide each panelboard with directory card holder and card for branch circuit load identification.

2.2.2.3 Furnish with nameplate engraved with designation shown on panelboard schedule. Attach nameplate to front of panelboard above door.

2.2.2.4 Branch circuit breakers: Molded case bolt-on type with thermal magnetic trips, meeting the requirements of FS W-C-375. Number, rating and arrangement are shown on panelboard schedule or one-line diagram. Permanently number branch circuits. Number tabs shall not be attached to, or be part of, circuit breaker.

a. Branch circuit breaker positions marked "space": Bussed for future circuit breakers. Provide removable single pole filler plates for spaces shown on panelboard schedule.

b. Branch circuit breakers marked "S" shall be UL listed for switching duty.

c. Branch circuit breakers marked "G" shall include ground fault circuit interrupter.

2.2.3 General Purpose Transformers: Dry type, 60 hertz, of kVA rating shown on the Drawings with minimum two 2-1/2 percent taps above and two 2-1/2 percent taps below normal rated primary voltage. Insulation system rated 70 C with 115 C winding temperature rise above ambient. Transformers shall be floor-mounting and meet the requirements of NEMA ST 20.

2.2.4 Combination Motor Controllers: Horsepower rated, with 2 NO and 2 NC auxiliary contacts. Bimetallic type overload elements are acceptable. Overload relay reset and momentary contact start-stop pushbutton in cover. Circuit breakers shall meet the requirements of FS W-C-375 and be instantaneous motor circuit protector type. Controllers shall meet the requirements of NEMA ICS 2-321.

2.2.5 Magnetic Contactors: NEMA Size 1, having 8 normally open contacts, and operating coil rated at 277V ac, with NEMA 1 enclosure. Contactors shall meet the requirements of NEMA ICS 2-211.

2.2.6 Terminal Blocks

2.2.6.1 For #10 AWG conductors and smaller: Either 1-piece or factory assembled sectional double terminal, barrier type, with binder screw terminals. Terminal ampacities shall be equal to or greater than conductor ampacities. Marathon or Buchanan.

2.2.6.2 Furnish covers to cover live parts of terminations for circuits of more than 150 volts to ground. Provide with means for ready inspection and full width marking areas.

2.2.7 Lighting Fixtures: Furnish with parts and fittings necessary to install in accordance with manufacturer's instructions.

2.2.7.1 Fixtures of each type described shall be of 1 manufacturer and identical finish and appearance.

2.2.7.2 Fluorescent fixture ballasts: High power factor type, rated for voltage shown on the Drawings or in this Section, suited for fixture temperature environment, and provided with automatic resetting thermal protector. Ballasts shall meet the requirements of ANSI C82.1.

2.2.7.3 Catalog numbers, when called out in subparagraph 2.2.7.4, are for individual units.

2.2.7.4 Lighting fixtures shall be as follows:

a. Fixture A: Industrial fluorescent, 8 feet, 2-F96TR Slimline lamps, 277 volt, 10 percent up-light component, with wire guard. Ballast shall be CBM/ETL unit with operating temperature range to 0 F. Metalux catalog No. IA-296A-277-V.

b. Fixture B: Industrial fluorescent, same as Fixture A except to include an emergency power-pak in fixture wireway.

c. Fixture D: Outlet box lamp holder, porcelain, medium base, keyless, 660 watts, 250 volt, with 2 screw terminals and 100 watts incandescent lamp.

d. Fixture F: Exterior low-pressure sodium wall pack, 135 watts, 120 volt, aluminum body with polycarbonate lens and up-light shield, and internally-mounted photocell. Voigt catalog No. 0-38-120-PI.

2.2.7.5 Photoelectric cell controls: Diecast aluminum weatherproof housing with hermetically sealed light sensitive element, having manually adjustable light level slide with turn-on range of 2 foot-candles.

2.2.8 Receptacles: Duplex, brown, specification grade, rated 15 ampere, 120 volt, 3 wire, grounding type, meeting the requirements of NEMA WD 1 Designation 5-15R with screw terminals arranged for side wiring. Self-grounding receptacles may be used instead of ground requirements specified.

2.2.9 Toggle Switches: Brown, specification grade, 3 way, rated 20 amperes, 277 volts, with conventional handles, screw terminals arranged for side wiring, and meeting the requirements of FS W-S-896.

2.2.10 Plates

2.2.10.1 Receptacle: Finish pressed steel.

2.2.10.2 Toggle switch: Finish pressed steel.

2.2.11 Paging System

2.2.11.1 Amplifier: 35 watts of output power, 100 hertz-10 kHz frequency response, with 2 MIC and 1 AUX inputs, balanced low-impedance microphone inputs, and individual bass and treble controls. Bogen Model C35C.

2.2.11.2 Microphone: Desk type dynamic, omni directional, push-to-talk operation with locking feature, dual impedance, die cast base, and 7'-0" cord. Bogen Model MBS-1000.

2.2.11.3 Speakers, Indoor: 7.5 watt (adjusted for 5 watt operation) variable impedance, with 6 inch diameter projector. Bogen Model SPT-5A.

2.2.11.4 Speaker, Outdoor: 15 watt, variable impedance, weatherproof, with all-purpose mounting bracket. Bogen Model SPT-15A.

2.2.12 Beacon: Flashing, 120V ac, with red acrylic dome, and polished stainless steel parabolic reflectors. Unit shall be weatherproof and designed for mounting on 1/2 inch NPT threaded conduit. Edwards Adaptabeacon Catalog No. 50R.

2.2.13 Bell: Vibrating, weatherproof, 120V ac, 6 inch with back box. Edwards Adaptable Catalog No. 340-6N5.

2.2.14 Pushbutton Station: Oiltight in cast enclosure, single NO-NC contact block, standard pushbutton without legend plate. Provide nameplate as specified in Paragraph 2.1.5. Cutler-Hammer No. 10250T4342.

2.2.15 Pull Box (PB): Type SG, 12 inch x 12 inch x 6 inch, screwed cover, 14 gage material.

2.2.16 Junction Box (JB): Type SC, 6 inch x 6 inch x 4 inch, screwed cover, 14 gage material.

2.2.17 Air monitor, continuous, Beta-Gamma. Similar to Eberline Model AMS-3.

2.2.18 Air pump, regulated, 1/4 hp, 115 Vac, 6 amp, 26" hg vacuum. Similar to Eberline Model RAP-1.

2.2.19 Air monitor, continuous, alpha. Similar to Eberline Model Alpha-6.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Field Measurements: Scale dimensions on Drawings show desired and approximate location of equipment; actual locations, distances, and levels shall be governed by field conditions.

3.2 INSTALLATION

3.2.1 General

3.2.1.1 Perform work in accordance with the NEC.

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

a. Use clamping devices for attaching to structural steel, or, when clamping is impracticable, obtain written authority from KEH to weld to, drill or cut structural members to provide attachment.

b. Fasten equipment to concrete or masonry with expansion anchors.

c. Attach to drywall by screws into studs, and to metal wall panels by weld studs, bolts or self-tapping metal screws.

d. Locate equipment, boxes and conduit approximately where shown in relation to equipment served.

e. Do not install conduit raceways and boxes in positions that interfere with work of other trades.

f. Identify components by nameplate engraved with designation and function shown on the Drawings.

g. Attach nameplates on or near equipment with clear RTV silicone sealant.

3.2.1.3 Use appropriate special tools when installing devices for which special installation tools are recommended by manufacturer.

3.2.2 Grounding Systems

3.2.2.1 All welded connections shall be wire brushed and all buried welds and welds exposed to weather shall be coated with asphaltic paint a minimum of 6 inches in each direction from the weld.

3.2.2.2 Grounding cables shall be protected against mechanical damage before and during backfill. Backfill material within 1 foot of cables shall not contain rocks larger than 2 inches in diameter.

3.2.2.3 Connections between galvanized steel and copper conductors shall be above grade and in a dry location.

3.2.2.4 Ground steel columns to grounding grid.

3.2.2.5 Location of perimeter ground grids shall meet the following:

a. Be 3 feet, plus or minus 6 inches, from building foundations.

b. Be separated by 1 to 2 feet.

c. Be buried a minimum of 1 foot below floor slabs and 2 feet 6 inches below grade.

All grid intersections shall be exothermally welded.

3.2.2.6 Ground rods shall be 3 to 4 feet outside of perimeter grids.

3.2.2.7 Ground neutral conductors of 3-wire, single-phase, and 4-wire, 3-phase, wye connected distribution systems.

3.2.2.8 Ground equipment in accordance with NFPA 70.

3.2.3 Conduit

3.2.3.1 Use rigid steel or intermediate metal where conduit is subject to mechanical damage, installed in concrete floors and walls, or exposed to weather. Electrical metallic tubing may be used elsewhere except 2 inch buried conduit shall be PVC Schedule 80.

3.2.3.2 Install #14 gage galvanized steel pull wire or 1/8 inch polyethylene rope in spare conduits.

3.2.3.3 Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines. Where conditions permit, maintain continuous exposed horizontal runs along walls at minimum height of 9 feet above floor level or grade.

3.2.3.4 Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.3.5 Cut square, ream and remove burrs. Conduit shall be clean, dry, and free of debris. Immediately after installation, plug or cap exposed ends with standard accessories until wires are installed.

3.2.3.6 Use galvanized steel locknuts and insulated bushings for attachment to enclosures except threaded hubs or sealing type locknuts shall be used outdoors or where moisture is present. Threadless fittings will not be permitted for rigid conduit. Use Erickson type couplings where required. Do not use running threads.

3.2.3.7 Use 1 hole clamps equipped with clampbacks or Unistrut with clamps to secure conduits.

3.2.3.8 Flexible conduit

a. Use to make connections to motors and other equipment subject to vibration. Use liquidtight flexible metal conduit where conduit and fittings are installed outdoors or exposed to moisture or chemical fumes indoors.

b. Use in lengths not exceeding 4 feet for other equipment, with approval of KEH.

3.2.3.9 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.3.10 Install exposed conduit stubbing up through floor slab straight and plumb, lined up, and uniformly spaced. Install at sufficient depth below slab to eliminate part of bend above top of slab. Cap or plug stub-up before placing concrete. Verify stub-up locations with final equipment arrangements.

3.2.3.11 Wrap conduit passing from concrete to air with conduit protection tape from 3 inches in concrete to at least 12 inches in earth, or 3 inches in air.

3.2.3.12 Seal opening around conduit at exterior wall penetrations and penetrations of walls which form boundaries between adjoining ventilation zones, using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

3.2.3.13 Use hangers with 3/8 inch rods for 2 inch conduit and smaller. If conduit is suspended on rods more than 2 feet long, rigidly brace to prevent horizontal motion or swaying.

3.2.3.14 Apply duct sealing compound after installation of conductors, at boxes, in conduits that penetrate walls or floors.

3.2.4 Boxes, Enclosures and Wiring Devices

3.2.4.1 Install boxes firmly in position and plumb.

3.2.4.2 Install dust covers on junction, pull, and outlet boxes, and other types of wiring outlets at initial installation. Do not remove dust covers until wires are installed and permanent cover or device is placed on box or outlet.

3.2.5 Conductors

3.2.5.1 Maximum pulling tension on conductors: Recommended by manufacturer.

3.2.5.2 Identify each conductor designator by wire number on the Drawings with wire marker. Attach wire marker at each termination point within 2 inches of wire termination. Marker nomenclature shall be visible without moving wire or marker.

3.2.5.3 Paint or pressure-sensitive colored tape may be used for coding conductors instead of colored insulation on #8 AWG and larger wire only.

3.2.5.4 Use lubricant recommended by cable manufacturer, or wire pulling compound specified, to decrease friction when pulling wire and cable through conduit.

3.2.5.5 Do not install or handle wires with thermoplastic insulation or jacket when ambient temperature is 15 F or below.

3.2.6 Splices, Taps and Cable Terminations

3.2.6.1 Make splices and taps in building wire with solderless connectors described in Paragraph 2.1.1. Use connectors in accordance with manufacturer's instructions.

3.2.6.2 Use plastic insulating tape for uninsulated splices and taps. Apply tape to thickness at least equal to conductor insulation. Where bolted splice or connection presents irregular surface, apply insulating putty to joints before taping.

3.2.6.3 Use crimp-on type ring or spade lugs with turned up legs for wire terminations of stranded conductors to binder screw or stud type terminals. Lugs shall have insulated sleeves.

3.2.7 Lighting Fixtures: Mount suspended lighting fixtures as shown on the Drawings. Use fixture stud if lighting fixture is suspended from outlet box. Only keyless fittings may use box cover fastening screws for support.

3.2.8 Paging System: The amplifier and microphone shall be shelf-mounted near the east door as shown on the Drawing. Conduit containing speaker wires shall terminate in an insulated bushing at the amplifier. Speakers shall be mounted 17'-0" above floor or grade, and shall be connected to an outlet box via portable cord.

3.3 FIELD QUALITY CONTROL

3.3.1 Testing, General

3.3.1.1 Test equipment and wiring for continuity and unintentional grounds, and verify proper phase sequence and voltage at equipment served before attempt is made to operate equipment. Document results of tests performed. Notify KEH before start of tests. Correct items found, during testing or examination by KEH, to be at variance with the Drawings and this Section.

3.3.1.2 Furnish instruments, labor and equipment required to conduct testing.

3.3.1.3 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.4 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

3.3.2 Motors

3.3.2.1 Check for correct rotation.

3.3.2.2 Measure and record voltage and current, and verify value agrees with data on nameplate.

3.3.3 Wiring Systems

3.3.3.1 Megger conductors rated 600 volts and used for services, feeders or branch circuits over 150 volts to ground, phase-to-phase, and phase-to-ground. Minimum acceptable value of insulation resistance is 200 megohms. Megger manufacturer's instruction pamphlet, furnished with megger, shall provide instructions for conducting tests. Disconnect devices not capable of withstanding voltage or current of megger test, such as indicating instruments, relays and lamps, before test is made. Voltage output of megger shall be 1000V dc, nominal.

3.3.3.2 Test wiring operating less than 150 volts to ground for continuity and unintentional grounds. Resistance shall not exceed 1 ohm on continuity checks.

3.3.3.3 Contractor may elect to group and connect together conductors within raceway while performing megger test. Record all readings. Repeat megger test after replacement of defective wiring.

3.3.3.4 Reconnect devices disconnected during testing.

SECTION 16720

ALARM AND DETECTION SYSTEMS

PART 1 - GENERAL

1.1 REFERENCES

1.1.1 Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of this Section to extent designated herein.

- 1.1.1.1 American National Standards Institute (ANSI)
ANSI C80.1-1983 American National Standard for Rigid Steel Conduit--Zinc Coated
- 1.1.1.2 Factory Mutual System (FM)
1991 Edition Approval Guide
- 1.1.1.3 National Electrical Manufacturers Association (NEMA)
Standards Publication/ No. FB 1-1988 Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies
Standards Publication/ No. ICS 6-1988 Enclosures for Industrial Controls and Systems
- 1.1.1.4 National Fire Protection Association (NFPA)
NFPA 70 National Electrical Code, 1990 Edition
NFPA 72 Standard for the Installation, Maintenance and Use of Protective Signaling Systems, 1990 Edition
NFPA 72E Standard on Automatic Fire Detectors, 1987 Edition
NFPA 1221 Standard for the Installation, Maintenance and Use of Public Fire Service Communication Systems, 1988 Edition
- 1.1.1.5 Underwriters Laboratories, Inc (UL)
1991 Electrical Appliance and Utilization Equipment Directory

1991	Electrical Construction Materials Directory
1991	Fire Protection Equipment Directory
UL 38-1981 w/Rev through Sep 1981	Standard for Manually Actuated Signaling Boxes for Use With Fire-Protective Signaling Systems
UL 797-1977	Standard for Electrical Metallic Tubing
UL 1242-1985	Standard for Intermediate Metal Conduit

1.2 SUBMITTALS: Refer to Section 01300 for submittal procedures.

1.2.1 Approval Data: Submit information listed in Column 5 of Approval Data List in this Section.

1.2.2 Vendor Information: Submit information listed in Column 5 of Vendor Information List in this Section.

1.3 QUALITY ASSURANCE

1.3.1 Standards: Products shall be identified for intended purpose by UL in the Electrical Appliance and Utilization Equipment Directory or Electrical Construction Materials Directory, and bear listing mark of laboratory.

1.3.1.1 Use fire alarm equipment listed in UL Fire Protection Equipment Directory or FM Approval Guide bearing mark of listing organization.

1.3.1.2 Fire alarm system design, components, and installation shall meet the requirements of NFPA 70, 72, 72E, and 1221.

PART 2 - PRODUCTS

2.1 MATERIALS

2.1.1 Solderless Connectors: Pressure type, rated for use with copper or aluminum conductors, and used in installations not exceeding 600 volts between conductors. Connectors with insulating caps or covers shall be rated for system utilization voltage. Connectors shall be types specified below.

2.1.1.1 Ideal Industries, Inc "Crimp Connector."

2.1.1.2 Thomas and Betts Company "Sta-Kon."

2.1.1.3 Coaxial cable connectors type PL259 crimp-on.

2.1.2 Raceways, Fittings, and Boxes

2.1.2.1 Conduit shall meet the requirements of appropriate standard as follows.

- | | | |
|----|----------------------------------|------------|
| a. | Rigid steel | ANSI C80.1 |
| b. | Intermediate metal | UL 1242 |
| c. | Electrical metallic tubing (EMT) | UL 797 |

2.1.2.2 Conduit fittings for rigid steel and electrical metallic tubing shall meet the requirements of NEMA FB 1. Only compression type threadless fittings shall be used with EMT.

2.1.2.3 Conduit entries into sides or tops of NEMA Type 3 or NEMA Type 3R enclosures shall be made with "Myers" type watertight fittings, or sealing locknuts similar to those manufactured by Midwest Electric Manufacturing Corp.

2.1.2.4 Exterior lighting fixture outlet boxes shall be cast with threaded hubs.

2.1.3 Conductors: Stranded copper, Type THWN/THHN.

2.1.4 Wire Pulling Compound: Not permitted.

2.1.5 Plastic Insulating Tape: Similar to Scotch No. 33+ manufactured by 3M Company.

2.1.6 Wire Markers: Thermal printed, heat shrink tube type similar to those manufactured by Brady.

2.1.7 Hangers for Individual Conduits: Factory made springable wrought steel clamps or malleable iron, split and hinged rings. For suspended conduit, clamps or rings shall be bolted to, or interlocked with threaded suspension rod.

2.1.8 Decals: Red with 1/2 inch white letters "FIRE ALARM SYSTEM" with adhesive back, similar to those manufactured by Action Industrial Systems.

2.1.9 Fire-Rated Sealant: 3M-CP-25, or Biotherm, one part sealant, UL listed fire barrier sealant manufactured by Bio-Fire Protection Ltd. Prime as recommended by sealant manufacturer.

2.2 EQUIPMENT

2.2.1 Fire alarm equipment enclosures shall meet the requirements of NEMA ICS 6-110 and be Type 1.

2.2.2 In the following paragraphs, equipment designated by manufacturer or trade name shall be supplied. No substitutions will be accepted.

2.2.3 Fire Alarm Control Panel: Pyrotronics CP-400.

2.2.3.1 Enclosure shall be designed for surface mounting: Panel door shall have a cylinder lock with key matched to Corbin Catalog No. 60.

2.2.3.2 Provide one fire detection zone, minimum, with end-of-line supervision to detect open circuit or unintentional grounds, in accordance with NFPA 72A.

2.2.3.3 Indicating lights shall be labelled with their function.

2.2.3.4 Supply following panel mounted indicating lights and features:

- a. AC power ON (green).
- b. Low battery (amber).
- c. System fire alarm (red).
- d. System trouble (amber).
- e. Zone alarm (red).
- f. Zone trouble (amber).
- g. Signalling circuit trouble (amber).
- h. Alarm gong silence-normal-test switch, with indicating light for silence position (red). Test and silence positions shall not transmit signal to fire station. Ring-back shall occur if panel is reset with gong switch in silence position.
- i. Trouble silence-normal switch, with indicating light for silence position (amber), with ring-back when panel is reset to normal with switch in silence position.
- j. Reset-normal-test switch.
- k. Trouble alarm buzzer.
- l. Two alarm signalling circuits.
- m. Fire alarm activating device and circuits.
- n. Supervisory activating device and circuits.
- o. Automatic power transfer switch.
- p. End-of-line supervisory devices.
- q. Terminal blocks for wiring.
- r. Remote trouble relay with form C contacts.
- s. Battery charger.

2.2.3.5 Alarm signals shall latch and require manual reset.

2.2.3.6 Control panel operation.

shall: a. On incoming fire alarm signal, fire alarm activating device

- 1) Trip existing radio master alarm box by zone.
- 2) Light fire alarm indicating lamp.
- 3) Light incoming signal zone indicating light.
- 4) Operate building alarm gongs.
- 5) Shut down exhaust fans.

shall: b. On incoming trouble signal, supervisory activating device

- 1) Light trouble indicating lamp.
- 2) Light zone indicating lamp.
- 3) Transmit a trouble signal via the radio master alarm
- 4) Sound audible trouble signal at panel.

box.

c. Fire alarm signal shall be initiated by:

- 1) Operating manual pull station in system.
- 2) Operation of sprinkler head.

d. Trouble signal shall be initiated by:

- 1) Disconnecting device or wire in system.
- 2) Loss of ac circuit.
- 3) Closing of post indicator valve (PIV) or main
- 4) Open circuit.
- 5) Ground short not part of system design.
- 6) Removal of modules in fire alarm control panel.
- 7) Low battery voltage.

sprinkler valve.

e. Alarm gong circuit

1) Ringing circuit shall pulse 24V dc single stroke alarm gongs at rate of 2 strokes per second.

2) Circuit components may be in separate enclosure if there is no room in manufacturer's standard enclosure.

2.2.4 Manual Fire Alarm Stations: Pyrotronics Model No. MS-501. Noncoded, nonself-restoring double action type with single pole, normally open positive action contacts. Station shall have a hinged cover. Stations shall meet the requirements of UL 38, be for indoor surface mounting, and finished "Signal Red".

2.2.5 Alarm Bells: Pyrotronics 24 V dc supervised BDS Series. Bells shall be UL listed with single-stroke operation with optional shell sizes in 6 inch and 10 inch diameters. Bells shall also provide for semiflush mounting to standard 4 inch square backboxes, or surface mounting to Pyrotronics indoor IBH-2 backboxes. Current draw shall be 0.38 amp maximum.

2.2.6 Auxiliary Disconnect Box: Fabricate auxiliary function control in accordance with Drawings. Components shall be UL listed. Housing shall be hinged, weathertight construction. The key lock switch shall be Corbin, Catalog No. 60.

2.2.7 Power Supply

2.2.7.1 The primary power for the Radio Fire Alarm Master Box shall be obtained from the power panelboard as shown on the Drawings. The circuit breaker shall be red, fitted with a suitable guard (requiring the removal of a screw to open) and used only for fire alarm equipment. Label circuits used in the power panelboard.

2.2.7.2 Provide secondary battery operated power supply, with automatic cut-over and return, to operate fire alarm system and trouble signals in event of failure of facility power supply. Transferring from facility power supply to secondary power supply shall cause a trouble signal to be initiated. No false alarms shall occur due to loss or restoration of primary power.

2.2.7.3 Provide rechargeable batteries, Model BP-61, in accordance with NFPA 72B of heavy duty, sealed lead acid gelled electrolyte type battery assembly designed for fire alarm usage. Battery assembly shall be sized to operate system for minimum of 60 hours and sound gongs for a minimum of 5 minutes after loss of charging current.

2.2.7.4 Battery charger: Compatible automatic, solid state, constant voltage device with ac voltage compensation, dc voltage regulation and current limiting.

2.2.8 Radio Fire Alarm Master Box: The radio fire alarm master box and antenna will be furnished by others for installation hereunder.

2.2.9 Fire Alarm Locator Lighting Fixture: Locator light No. 332-8N5 outdoor lighting fixture, incandescent, Type N, Crouse-Hinds Vaportight Catalog No. VG175 with VN75 red glass globe, V911 guard, VXF10 outlet box, and 100 watt lamp.

2.2.10 End-Of-Line Resistor or Diode: Sized and provided by fire alarm equipment supplier.

PART 3 - EXECUTION

3.1 PREPARATION

3.1.1 Field Measurements: The Drawings show general layout of complete system including arrangement of equipment. Verify scale dimensions since actual locations, distances, and levels shall be governed by field conditions.

3.2 INSTALLATION

3.2.1 General

3.2.1.1 Perform work in accordance with NFPA 70 (NEC), 72A, 72B, 72G, and 1221.

3.2.1.2 Fasten equipment to structural members of building or metal supports attached to structure.

a. Attach to existing partitions by screws.

b. Locate equipment, boxes, and conduit approximately where shown in relation to equipment served.

c. Do not install conduit raceways and boxes in positions that interfere with work of other trades.

3.2.2 Conduit

3.2.2.1 Use rigid steel, intermediate metal, or electrical metallic tubing for work described by this project.

3.2.2.2 Install concealed conduits as directly as possible and with bend radii as long as possible. Install exposed conduit parallel with or at right angles to building lines.

3.2.2.3 Make elbows, offsets and bends uniform and symmetrical. Bend conduit with approved bending devices.

3.2.2.4 Use galvanized steel locknuts and bushings for attachment to enclosures except threaded hubs may be used where permitted by the NEC. Threadless fittings will not be permitted for rigid conduit. Use Erickson-type couplings where required. Do not use running threads.

3.2.2.5 Use one-hole clamps equipped with clampbacks to secure conduits.

3.2.2.6 Use "Myers" type watertight fittings for conduit entry to radio fire alarm box.

3.2.2.7 Set up joints in conduit installed in concrete, underground, or exposed to weather, with high temperature, antiseize, conductive thread lubricant and sealant.

3.2.2.8 Seal opening around conduit at exterior wall penetrations and penetrations of walls which form boundaries between adjoining ventilation zones, using specified sealant. Make seal waterproof and finish sealant flush with surrounding wall surface.

3.2.3 Boxes, Enclosures, and Wiring Devices

3.2.3.1 Install boxes firmly in position and plumb.

3.2.3.2 Install extension ring with blank cover on flush-mounted junction boxes where box serves permanently installed equipment.

3.2.3.3 Place "FIRE ALARM SYSTEM" decals on all junction boxes.

3.2.4 Conductors

3.2.4.1 Do not bend cables installed in wireways to less than manufacturer's recommended minimum bending radius. Bind single conductors installed in wireways with nylon cable ties to form cable assemblies. Lay cables in wireways in straight parallel lines, and avoid crossing.

3.2.4.2 Use following color code for fire alarm system conductors:

<u>Circuit</u>	<u>Color</u>	<u>Min. AWG</u>
From fire alarm control panel to the radio master alarm box	Orange	14
Alarm initiating devices-- detectors, manual stations, etc	One Lt Blue and one DK Blue	14
Supervisory devices--limit switches, pressure supervisory switches, etc	One Yellow and one Tan	14
Alarm Bells	One Red and One Black	14
Other wiring	Blue or different from preceding colors	Varies
AC power	Black, White, and Green	12
Battery Wiring	Brown	Varies

3.2.5 Devices

3.2.5.1 Connect wiring to components within the fire alarm control panel in accordance with the Drawing and vendor information prints.

3.2.5.2 Mount manual pull stations at 4'-6" above floor.

3.2.6 Cable Terminations: Use crimp-on type spade lugs for wire terminations of stranded conductors to binder screw or stud type terminals. Spade lugs shall have upset legs and insulation sleeves sized for conductors.

3.3 FIELD QUALITY CONTROL

3.3.1 Testing, General

3.3.1.1 Test equipment and wiring installed before attempt is made to operate equipment. Resistance, current, and voltage measurements may be made as work progresses. Notify KEH before start of required tests. Correct items found, during testing or examination by KEH to be at variance with the Drawings and Specifications. Deliver test reports to KEH weekly as completed.

3.3.1.2 Initial operation and testing of radio fire alarm box will be performed by Westinghouse Hanford Company (WHC) telecommunications. Do not energize radio fire alarm box until directed to by the WHC telecommunications personnel.

3.3.1.3 Furnish instruments, labor and equipment required to conduct testing.

3.3.1.4 Use test instruments which bear valid calibration stamp showing date of calibration and expiration date of stamp. Calibration and accuracy of test instruments shall be certified by independent testing laboratory having standards traceable to the National Bureau of Standards.

3.3.1.5 In addition to testing specified to be performed by Contractor, installation will be subject to examination by KEH for conformance with design and applicable codes. Assist KEH as requested.

3.3.2 Wiring Systems: Test fire alarm circuits for continuity.

3.3.3 Acceptance Testing: Operability of fire alarm modifications shall be verified by Acceptance Test Procedures (ATP) No. 4783 for Building WD, No. 4784 for Building WC, and No. 4785 for Building WB, which are parts of the design packages.

APPENDIX A

SAMPLE BATTERY CALCULATION

ALARM MANUFACTURER: Fireco
ALARM PANEL TYPE: Model FACP-7
REFERENCE DRAWINGS: M123 Control Panel Wiring
Diagram M374 Zone Alarm Module
M339 Alarm Trouble Module, etc.

CURRENT DEMAND

SYSTEM COMPONENTS:	NORMAL SUPERVISORY	ALARM CONDITION
Zone Alarm Module	0.005A	0.065A
Trouble Module	0.003A	0.020A or 0.0
Fire Alarm Module	0.005A	0.050A
Ionization Detectors	0.003A	0.035A
Ultraviolet Detectors	0.005A	0.045A
Indicator Lam	-	0.030A
Auxiliary Relay Coil	-	0.025A
Masterbox Coil	-	0.045A

SYSTEM COMPONENTS

NORMAL SYSTEM DEMAND

(6) Zone Alarm Modules	0.030
(1) Trouble Module	0.003
(1) Fire Alarm Module	0.005
(3) Ionization Detectors	0.009
(1) Ultraviolet Detector	<u>0.005</u>
	0.052A @ 60 hr =
3.120AH	

SYSTEM COMPONENTS

FIRE ALARM DEMAND

(5) Zone Module (Supervisory)	0.025
(1) Zone Module (Alarm)	0.065
Fire Alarm Module	0.050
(2) Ionization Detectors	0.070
Indicator Lamp	0.030
Aux Relay Coil	0.025
Masterbox Coil	<u>0.045</u>
	0.310A @ 1 hr =
0.310AH	

CONTINGENCY - 20% of normal Supr Demand 3.12 AH
0.624AH

TOTAL TIME ADJUSTED CURRENT DRAW:
4.054AH

END OF APPENDIX A

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SPECIFICATION (W-016-C3, Rev. 2)

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