

EXHIBIT F

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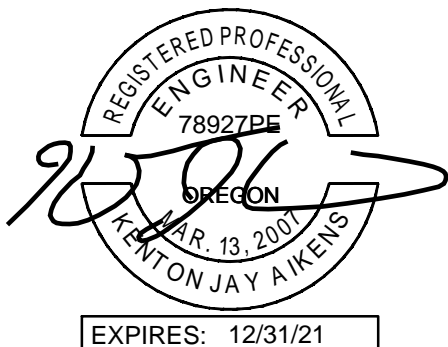
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## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.01 SUMMARY OF WORK

- A. The Work Contract consists of replacing building fire alarm system in the Kerr Administration Building on the Oregon State University Campus, Corvallis, Oregon. Work to include removal of original system after completion of the new system.
- B. Work shall be started within ten (10) calendar days after signing of Contract on behalf of Oregon State University. The Contract may not be signed prior to approval of the Contractor's Certificate of Insurance by Construction Contract Administration (CCA), Oregon State University. Substantial Completion shall be reached no later than April 30, 2021, with Final Completion being reached no later than June 14, 2021.

##### 1.02 CONTRACTORS USE OF PREMISES

- A. Contractor shall limit use of the Premises for work and storage to allow for:
  - 1. Owner occupancy, day and night.
  - 2. Public use, day and night.
  - 3. Security.
  - 4. Safe entry and exit for vehicles and pedestrians.
  - 5. Fire egress.
- B. Coordinate all operations with the Owner's Authorized Representative during the construction period. A 96 hour notification is required prior to scheduled utility shutdowns or street closures, but more lead time is often required to schedule around other critical activities.
- C. Limit Contractor's employee parking to locations designated at the Pre-construction Conference.

##### 1.03 OWNER OCCUPANCY

- A. The Owner will occupy the Premises during the entire period of construction for the conduct of normal operations. Cooperate with Owner's Authorized Representative in construction operations to minimize conflict and to facilitate the Owner's usage especially in the following areas:
  - 1. Restricted access and parking.
  - 2. Use of stairs.
  - 3. Storage space availability.
- B. Conduct operations in such a way to ensure the least inconvenience to the general public, including:
  - 1. Limitations and easements.

2. Emergency vehicle access.
3. Building access to the public, day and night.

#### **1.04 ASBESTOS AND OTHER HAZARDOUS MATERIAL**

- A. The Owner has made a reasonable attempt to locate and identify asbestos or other hazardous material that may be encountered during the course of the Work.
- B. If the Contractor observes or suspects the existence of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials in the structure or components of the building, the Contractor shall immediately stop work and notify the Owner's Authorized Representative.
- C. The Owner will arrange for the removal of asbestos, polychlorinated biphenyl (PCB) or other hazardous materials as required by Facilities Services personnel or by separate contract.
- D. Schedule ten (10) days of slack or "down" time for the removal of hazardous materials without penalty to Owner for the delay of the Contract.

#### **1.05 LEAD BASED PAINT**

- A. The Owner may have tested existing paint in the project area and if levels are found the following conditions apply.
- B. Contractor shall remove paint as specified for surface preparation and capture removed material for disposal.
- C. Contractor shall follow OSHA guidelines involving exposure to workers.
- D. Owner will provide containers for Contractor's use at project site.
- E. Contractor shall comply with the requirements of DEQ and EPA and shall submit a lead abatement plan.
- F. Contractor shall separate lead contaminated material from effluent and water.
- G. Owner will dispose of lead paint and effluent resulting from stripping operation.
- H. Soil contaminated by stripping operations shall be replaced with topsoil.

**END OF SECTION**

## SECTION 01 24 76

### APPLICATIONS FOR PAYMENT

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Work of this Section includes forms and procedures for progress payments.
- B. Related work specified elsewhere.
  - 1. For the primary discussion of payments, refer to OSU General Conditions, Section E, as supplemented.
  - 2. In compliance with OSU General Conditions, Section K, no payments beyond 75% will be made by the Owner before draft Operation and Maintenance Manuals have been received for review by the Owner.

##### 1.02 APPLICATION FORMS

- A. For applications for payment, use sample Contract Payment Request (see below), contract payment request on company letterhead, or AIA Document G702, supported by AIA Document G703, Continuation Sheet, or similar document.
- B. Prepare the Schedule of Values in such a manner that each major item of Work and each subcontracted item of Work is shown as a line item broken down in terms of material and labor costs on AIA Document G703, Application Certification of Payment, Continuation Sheet or similar format. The sample continuation sheet shall be the minimum Schedule of Values breakdown.
- C. The Schedule of Values shall be submitted for review by the Owner prior to the first application for payment; and may be used when, and only when, accepted in writing by the Owner.
- D. Payment request is to include the Contractor's Federal Tax Identification number and return address.

##### 1.03 PAYMENTS

- A. The Owner will make progress payments on account of the Contract once monthly for the scheduled duration of the project (i.e. three (3) payments on a three-month project), based on the value of work accomplished or materials on the job site, as stated in the Schedule of Values on the Application and Certificate Payment.
- B. Notwithstanding the foregoing, as this project is scheduled to take approximately nine (9) months to complete, Owner will only make nine (9) payments, plus a final retainage payment, as applicable.
- C. Complete and forward Application to the Owner on or about the 15th day of each month for work performed the previous month and include certified payroll statements as specified in the OSU General Conditions.

- D. Submit one (1) copy of forms requesting payment to the Owner.
- E. Payments will be made on protected materials on hand at the job site properly stored, protected, and insured.
- F. Estimated quantities shall be subject to the Owner's review and judgment.

**1.04 EARLY PURCHASE AND PAYMENT OF MATERIALS AND EQUIPMENT**

- A. Order materials and equipment requiring a long lead or waiting time early so as not to delay progress of the Work.
- B. The Contractor will be reimbursed for early order materials or equipment upon receipt and verification of quality and quantity against submittals and shipping documents by the Owner's Authorized Representative.
- C. Receipt shall be to the job site or stored at Owner's other premises in an orderly and safe manner, secured from normal weather damage.
- D. Security remains the responsibility of the Contractor.

**END OF SECTION**

**CONTRACT PAYMENT REQUEST**

**DATE:** \_\_\_\_\_

**TO:** University Financial Services  
Oregon State University  
3015 SW Western Blvd  
Corvallis, OR 97333

Payment Request No. \_\_\_\_\_ Contract No. \_\_\_\_\_ Period from \_\_\_\_\_ to \_\_\_\_\_

Project: \_\_\_\_\_

Original Contract Amount ..... \$ \_\_\_\_\_

Change Orders (Net Amount)..... \$ \_\_\_\_\_

Contract Total to Date ..... \$ \_\_\_\_\_

=====

Total Completed and Stored to Date ..... \$ \_\_\_\_\_

Less Retainage (5%), if applicable ..... \$ \_\_\_\_\_

Total Earned, Less Retainage (if applicable) ..... \$ \_\_\_\_\_

Less Previous Payments..... \$ \_\_\_\_\_

**Net Amount Due this Request..... \$ \_\_\_\_\_**

The undersigned Contractor certifies that, to the best of his/her knowledge, information, and belief, the Work covered by this request has been completed in accordance with the Contract Documents, that all amounts have been paid for Work for which previous applications for Payment were issued and payments received from the Owner, and that the amount shown herein is now due.

Contractor: \_\_\_\_\_

By: \_\_\_\_\_ Date: \_\_\_\_\_

Federal Tax ID Number: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_







## SECTION 01 25 00

### PRODUCT SUBSTITUTION PROCEDURES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. General requirements for the Work in relation to substitutions and product options.
- B. Submit to the Owner's property insurance carrier shop drawings, samples, and product data (such as manufacturer's standard schematic drawings and other literature) when required by individual Specifications sections.
- C. Related Work Specified Elsewhere
  - 1. Instructions to Bidders.
  - 2. OSU General Conditions.

##### 1.02 REQUESTS FOR SUBSTITUTIONS

- A. Requests for substitution of products in place of those specified shall be in accordance with Instructions to Bidders, and as specified herein.

##### 1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Investigate proposed products and determine that they are equal or superior in all respects to products specified.
- B. Provide same guarantee for accepted substitutions as for products specified.
- C. Coordinate installation of accepted substitutions into the Work, making such changes as may be required for the Work to be complete in all respects.

##### 1.04 SUBSTITUTIONS DURING BIDDING

- A. Submit two (2) copies of the following information with each request to the Owner:
  - 1. CSI substitution request form.
  - 2. Comparison of proposed substitution with product, material or system specified.
  - 3. Complete data, substantiating compliance of proposed substitution with the Contract Documents.
  - 4. Test numbers and supporting reports, indicating compliance with referenced standards.
  - 5. Evidence that warranty requirements are acceptable.
  - 6. Details indicating specific deviations proposed for the substitution.
  - 7. Reference and applicable Specification sections.
  - 8. Applicable product samples.
- B. All substitution requests shall be received in the Owner's office no less than ten (10) calendar days before bid opening. Requests received after this date will not be considered.

### **1.05 SUBSTITUTIONS DURING CONSTRUCTION**

- A. Substitutions will normally not be considered after date of Contract except when required due to unforeseen circumstances.
- B. Within a period of thirty (30) days after date of Contract, the Owner may, at its option, consider formal written requests for substitution of products in place of those specified, when submitted in accordance with the requirements stipulated herein.
- C. One or more of the following conditions must be documented in any such request:
  - 1. Required for compliance with final interpretation of code or insurance requirements.
  - 2. Required due to unavailability of a specified product.
  - 3. Required because of the inability of the specified product to perform properly or to fit in the designated space.
  - 4. Substitution would be substantially in the best interest of the Owner in terms of cost, time, or other considerations.

### **1.06 SUBSTITUTIONS NOT PERMITTED**

- A. If implied on submittals without first requesting approval thereof.
- B. If acceptance will require substantial revision of the Contract Documents.

**END OF SECTION**

SUBSTITUTION REQUEST FORM

TO: \_\_\_\_\_

PROJECT: \_\_\_\_\_

SPECIFIED ITEM: \_\_\_\_\_

Section	Page	Paragraph	Description
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The undersigned requests consideration of the following:

PROPOSED SUBSTITUTION: \_\_\_\_\_

Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes description of changes to Contract Documents which proposed substitution will require for its proper installation.

The undersigned states that the following paragraphs, unless modified on attachments, are correct:

1. The proposed substitution does not affect dimensions shown on Drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.

The undersigned further states that the function, appearance and quality of the Proposed Substitution are equivalent or superior to the Specified Item.

Submitted by:

Signature \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

Date \_\_\_\_\_

Telephone \_\_\_\_\_

Attachments:

For use by Design Consultant:

Accepted  Accepted as noted

Not Accepted  Received too late

By \_\_\_\_\_

Date \_\_\_\_\_

Remarks \_\_\_\_\_

## SECTION 01 31 19

### PROJECT MEETINGS

#### PART 1 GENERAL

##### 1.01 PRE-CONSTRUCTION MEETING

- A. Architect/Engineer/Designer, Contractor and Owner will meet prior to start of the Work (within seven (7) days after notice to proceed) to discuss at least the following topics and any others of mutual interest.
1. Schedule of Values
  2. Permit Status/tree protection/erosion control
  3. List of sub-contractors
  4. Job inspections.
  5. Early purchase of, and/or lead time requirements for material and equipment/prepurchase of equipment
  6. Monthly payment date/SOP for pay requests
  7. Portion of site to be occupied by construction.
  8. Parking/Staging areas
  9. Non-smoking campus requirements
  10. Maintenance of access and safety.
  11. Processing of field decisions and change orders
  12. Labor provisions/labor rates for subs
  13. Material submittals/deferred submittals
  14. Owner access during construction.
  15. Review of Contract Documents/review ADA requirements/cross-slopes
  16. Coordination procedures and separate contracts.
  17. Progress schedules.
  18. Critical Work sequencing.
  19. Safety and emergency procedures/24 hour contact numbers
  20. Security procedures.
  21. Hazardous materials.
  22. Progress meetings.
  23. Contract close-out.
- B. Location of Meeting: Project site

##### 1.02 PROGRESS MEETINGS

- A. The Contractor will schedule and administer progress meetings and will:
1. Prepare agendas.
  2. Schedule progress meetings, frequency, time and day to be determined during pre-construction meeting.
  3. Make physical arrangements for and preside at meetings.
  4. Record minutes and include decisions.

5. Distribute copies of minutes to participants within four (4) days after meetings.
- B. Location of Meetings: Project site.
- C. Attendance:
1. The Owner or Owner's Authorized Representative.
  2. Contractor.
  3. Subcontractors affected by agenda.
  4. Project Architect/Engineer/as necessary.
  5. Owner will attend meeting to ascertain Work is expedited consistent with progress schedule and with Contract Documents.
- D. Minimum Agenda:
1. Review and approve minutes from previous meeting.
  2. Review Work progress since previous meeting.
  3. Discuss field observations, and problems.
  4. Review delivery schedules, construction schedule, and identify problems which impede planned progress.
  5. Review proposed changes.
  6. Material submittals.
  7. Note all new subcontractors performing Work at the job site.

**END OF SECTION**

## SECTION 01 33 23

### SHOP DRAWINGS, PRODUCT DATA, SAMPLES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Submit to the Owner shop drawings, samples, and product data (such as manufacturer's standard schematic drawings and other literature) when required by individual Specifications sections.
- B. Related Work Specified Elsewhere
  - 1. Instructions to Bidders.
  - 2. OSU General Conditions.

##### 1.02 SUBMITTAL SCHEDULING

- A. For items requiring review by the Owner only, submittals shall be sent to the Owner at least 15 calendar days before the date each is required for fabrication or installation.
- B. Submittals to be reviewed by Owner's consultants shall be sent to the Owner at least 20 calendar days before the date each is required for fabrication or installation.
- C. Submittals to be reviewed by Owner's property insurance carrier shall be sent to Owner as directed in individual specification sections.
- D. Submittals involving Substitution requests or other modifications requiring review by the Owner and/or the Owner's consultants shall be sent to the Owner at least 20 calendar days before the date each is required for fabrication or installation.

##### 1.03 SUBMITTAL CONTENT AND FORMAT

- A. General Requirements:
  - 1. Shop Drawings: Submit in electronic format and, if requested by Owner's Authorized Representative, submit one reproducible transparency and 1 print of each drawing.
  - 2. Product Data: Submit electronically, and if requested by Owner's Authorized Representative, up to 6 hard copies.
  - 3. Samples: Submit the number and type stated in each Specification Section. Submit a minimum of three sets of color samples where color selection is required.
  - 4. Submittals shall include:
    - a. Date and revision dates return date requested.
    - b. Project title and number.
    - c. The names of the Contractor, subcontractor, supplier, and manufacturer.
    - d. Identification of product or material, with Specification Section number.
    - e. Relation to adjacent critical features of work or materials.
    - f. Field dimensions, clearly identified as such.

- g. Applicable standards, such as ASTM number or Federal Specification.
  - h. Identification of deviations from Contract Documents, and for products accompanied by Substitution request as required by Section 01 25 00.
  - i. Contractor's stamp legibly signed, essentially as follows:
    - 1) The undersigned, acting on behalf of the Contractor, certifies that this submittal has been reviewed and is approved; products have been verified as being as specified, field measurements and field construction criteria have been or will be coordinated, and the submittal is in compliance with Contract Documents.
5. Re-submission Requirements:
- a. Revise initial drawings as required and resubmit as specified for initial submittal.
  - b. Indicate on drawings any changes which have been made other than those requested by the Owner or the owner's consultants.
6. The Owner may return without review any submittal not meeting the requirements listed above.
- B. Shop Drawings:
- 1. Present data in a clear and thorough manner.
  - 2. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Documents.
  - 3. Structural items shall be identified by location in the completed structure. Identify details by reference to contract sheet and detail numbers.
  - 4. Minimum sheet Size: 8 ½ x 11".
- C. Product Data:
- 1. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations and other standard descriptive data:
    - a. Clearly mark each copy to identify pertinent product or models.
    - b. Show dimensions, weights, and clearances required.
    - c. Show performance data consisting of capabilities, ROM, KW, pressure drops, design characteristics and consumption; conforming as closely as possible to the test methods referenced in the Plans and Specifications.
    - d. Show wiring or piping diagrams and controls.
  - 2. Manufacturer's standard schematic drawings and diagrams:
    - a. Modify to delete information which is not applicable.
    - b. Supplement standard information to provide information specifically applicable to the Work.
- D. Samples:
- 1. Insure that samples are of sufficient size to indicate the general visual effect or color.
  - 2. Where samples must show a range of color, texture, finish, graining, or other property, submit sets of pairs illustrating the full scope of this range.



3. One (1) sample or one (1) set of approved samples will be retained by the Owner; final work will be measured against approved samples.

#### **1.04 QUALITY ASSURANCE**

- A. Process submittals in ample time for review, as applicable, so as to not delay the Work. All submittals shall be received by the Owner within ten (10) days after pre-construction.

#### **1.05 DEFINITIONS**

- A. The Owner will mark reviewed materials as follows:
  1. "No Exception Taken," which means fabrication, manufacture and/or installation may proceed.
  2. "Make Revisions Noted," which means fabrication, manufacture and/or installation may proceed with revisions as noted.
  3. "Revise and Resubmit," which means that fabrication, manufacture and/or installation may not proceed.
  4. "Rejected," which means do not proceed; make arrangements for the review of the proposed Work with the Owner as soon as possible.

#### **1.06 PROCESSING**

- A. Review submittals, make necessary corrections, and become familiar with the content of the submittals.
- B. Mark each item with Contractor's stamp.
- C. Accompany submittals with a transmittal letter bearing the project name, Contractor's name, number of items, and other pertinent data.
- D. Keep one copy of each reviewed submittal on the job site at all times.
- E. Be responsible for obtaining and distributing prints of shop drawings to the various suppliers, and the Owner once review process has been completed. Make prints of reviewed shop drawings only from transparencies which carry the appropriate stamp and endorsement.

**END OF SECTION**

**SECTION 01 42 13**

**ABBREVIATIONS AND SYMBOLS**

**PART 1 GENERAL**

**1.01 REQUIREMENTS INCLUDED**

- A. Words which may be found elsewhere in the Project Manual and Drawings are abbreviated in accordance with the standards set forth in the following table:

A/C	air conditioning	CEM	cement
AB	anchor bolt	CF	cubic foot
AC	asphaltic concrete	CFOI	contractor furnished owner installed
ACT	acoustical tile	CG	corner guard
AD	area drain	CH	ceiling height
ADD	addendum	CI	cast iron
ADD'L	additional	CJ	control joint
ADH	adhesive	CKBD	chalkboard
AFF	above finish floor	CL	centerline
AGG	aggregate	CLG	ceiling
AL	aluminum	CLR	clear(ance)
ALLOW	allowable	CM	construction manager
ALT	alternate	CMT	ceramic mosaic (tile)
ANOD	anodized	CMU	concrete masonry unit
AP	access panel	COL	column
APPRX	approximate	COM	communications
ARCH	architect(ural)	CONC	concrete
ASPH	asphalt	CONN	connect(ion)
AUTO	automatic	CONST	construction
AVE	avenue	CONT	continuous or continue
BD	board	CONTR	contract(or)
BIT	bituminous	CPT	carpet
BLDG	building	CRS	course(s)
BLKG	blocking	CS	countersink
BM	bench mark, beam(s)	CSMT	casement
BOT	bottom	CT	ceramic tile
BRZ	bronze	CTR	center
BS	both side	CVG	clear vertical grain
CB	catch basin	CW	cold water
		CWT	ceramic wall tile
		CY	cubic yard

D	depth	FA	fire alarm
DEMO	demolish, demolition	FAF	fluid applied flooring
DEP	depressed	FARF	fluid applied resilient floor
DF	drinking fountain	FAS	fasten, fastener
DIA	diameter	FBD	fiberboard
DIAG	diagonal	FBT	finished blowing temperature
DIM	dimension	FD	floor drain, fire damper
DISP	dispenser	FE	fire extinguisher
DIV	division	FEC	fire extinguisher cabinet
DL	dead load	FF	factory finish
DMT	demountable	FGL	fiberglass
DN	down	FHMS	flathead machine screw
DP	dampproofing	FHWS	flathead wood screw
DR	door	FIN	finish(ed)
DS	downspout	FLCO	floor cleanout
DT	drain tile	FLR	floor(ing)
DTL	detail	FLUR	fluorescent
DW	dumbwaiter	FND	foundation
DWG	drawing(s)	FOC	face of concrete
DWR	drawer	FOIC	furnished by owner/installed by contractor
EA	each	FOIO	furnished by owner/installed by owner
EB	expansion bolt	FOM	face of masonry
EF	each face	FP	fireproofing, flash point
EJ	expansion joint	FPHB	freeze-proof hose bib
EL	elevation	FR	fire resistive, fire rated
ELEC	electric(al)	FRM	frame(d), (ing)
EMBED	embedment	FS	full size
EMER	emergency	FSS	finished structural slab
ENCL	enclose(ure)	FT	foot
EP	electrical panel board	FTG	footing
EQ	equal	FTS	finished topping slab
EQUIP	equipment	GA	gage, gauge
EST	estimate	GALV	galvanized
EVT	equiviscous temperature	GB	grab bar or gypsum board
EW	each way	GC	general contractor
EWC	electric water cooler	GI	galvanized iron
EX.EXIT	existing	GL	glass, glazing
EXH	exhaust	GLS	glass resin wall surfacing
EXP	exposed		
EXT	exterior		

GP	gypsum	LL	live load
HB	hose bib	LONGIT	longitudinal
HBD	hardboard	LP	low point
HC	hollow core	LW	lightweight
HD	heavy duty	MAX	maximum
HDR	header	MB	machine bolt
HDW	hardware	M. MECH	mechanic(al)
HM	hollow metal	MFR	manufacture(r)
HOR	horizontal	MH	manhole
HP	high point	Min	minimum, minute
HR	hour	MISC	miscellaneous
HT	height	MO	masonry opening
HTG	heating	MO#	model number
HVAC	heating, ventilating, air conditioning	MOD	modular
HWD	hardwood	MPH	miles per hour
HWH	hot water heater	MS	machine screw
ID	inside diameter, identification	MTL	metal
IN	inch	MULL	mullion
INCIN	incinerator	MWP	membrane waterproofing
INCL	include(d), ion	NAT	natural, natural finish
INT	interior	NIC	not in contract
INV	invert	NO	number
JB	junction box	NOM	nominal
JC	janitor's closet	NTS	not to scale
JT	joint	OA	overall
KD	kiln dried	OBS	obscure
KCP	Keene's cement plaster	OC	on center(s)
KO	knockout	OD	outside diameter
KP	kick plate	OF	overflow
LAB	laboratory	OFCI	owner furnished contractor installed
LAM	laminated	OFOI	owner furnished owner installed
LAV	lavatory	OHMS	ovalhead machine screw
LBS	pounds	OHWS	ovalhead wood screw
LH	left hand	OPG	opening
		OPP	opposite
		OZ	ounce(s)
		P	paint(ed)

PB	push button	SIM	similar
PCF	pounds per cubic foot	SL	sleeve
PCP	putting coat plaster	SOG	slab on grade
PERF	perforate(d)	SPEC	specification(s)
PL	plate, property line	SQ	square
PLAM	plastic laminate	SS	storm sewer
PLAS	plaster	S4S	finished 4 sides
PNL	panel	SD	storm drain
PP	push plate	ST	steel, street
PR	pair	ST ST	stainless steel
PREP	prepare	STD	standard
PSF	pounds per square foot	STR	structural
PSI	pounds per square inch	SUPP	supplement
PT	point, pressure treated	SUPT	support
PTN	partition	SUSP	suspended
PVC	polyvinyl chloride	SV	sheet vinyl
PWD	plywood		
		T	tread
QT	quarry tile	TBM	top bench mark
		T&G	tongue and groove
R	rise	TB	towel bar
RA	return air	TC	top of curb
RAD	radius	TEL	telephone
RCP	reflected ceiling plan	TEMP	tempered
RD	roof drain	THK	thickness
REF	reference	TKBD	tackboard
REFR	refrigerator	TO	top of
REINF	reinforce(ing)	TP	top of paving
REQ	required	TRANS	transverse
RET'G	retaining	TS	top of slab
REV	revision(s), revised	TV	television
RH	right had	TW	top of wall
RM	room	TYP	typical
RO	rough opening		
RSF	resilient sheet flooring	UNO	unless noted otherwise
		VAT	vinyl asbestos tile
SC	solid core	VB	vapor barrier
SCHED	schedule	VCT	Vinyl Composition Tile
SEC	section	VERT	vertical
SF	square feet (foot)	VG	vertical grain
SHT	sheet	VIF	verify in field
SHTHG	sheathing		

VWC	vinyl wall covering	WP	waterproof(ing)
W	width, wide, water	WNS	wainscot
W/	with	WR	water resistant
W/O	without	WS	waterstop
WC	water closet	WW	window wall
WD	wood, wood finish	WWC	wood wall covering
		WWF	woven wire fabric

B. Words which may be found elsewhere in the Project Manual and Drawings are abbreviated in accordance with the standards set forth in the following table:

&	and
$\lambda$	angle
@	at
$\iota$	diameter, round
"	inches
:	is, shall b
'	feet
$\zeta$	perpendicular
/	per
%	percent
#	pound, number
X	by (as in 2 by 4)

**END OF SECTION**

## SECTION 01 42 16

### DEFINITIONS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Words which may be found elsewhere in the Contract Documents are defined in accordance with the standards set forth in the following table:

**Approve:**

Where used in conjunction with Architect's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "approved" will be limited to the Architect's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "approval" by Architect be interpreted as a release of Contract requirements.

**As Detailed, As Shown:**

Where "as detailed", "as shown" or words of similar importance are used, it shall be understood that reference to the Drawings accompanying the Specifications is made unless otherwise stated.

**As Directed, As Required, As Authorized, As Reviewed, As Accepted:**

Where "as directed", "as required", "as authorized", "as reviewed", "as accepted" or words of similar importance are used, it shall be understood that the direction, requirement, permission, authorization, review, or acceptance of the Architect is intended, unless otherwise stated.

**As Indicated:**

Where "as indicated" is used it shall be understood that reference to Drawings and/or Specifications is made unless otherwise stated.

**Directed, Requested, etc.:**

Terms such as "directed," "requested," "authorized," "selected," will be understood as "directed by Architect," "requested by Architect," and similar phrases shall not be interpreted to extend Architect's responsibility into Contractor's responsibility for construction supervision.

**Furnish:**

Except as otherwise defined in greater detail the term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.

**Indicated:**

The term "indicated" is a cross-reference to graphic representations, notes or schedules on drawings, to other paragraphs or schedules in the specifications and to similar means of recording requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for purpose of helping reader locate cross-reference and no limitation of location is intended except as specifically noted.

**Install:**

Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.

**Installer:**

The term "installer" is defined as the entity (person or firm) engaged by Contractor, or its subcontractor or sub-subcontractor for performance of a particular unit of Work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (Installers) be expert in operations they are engaged to perform.

**Provide:**

Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.

**END OF SECTION**



## SECTION 01 42 19

### REFERENCE STANDARDS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Quality Assurance.
- B. Location of References.
- C. Schedule of References.

##### 1.02 QUALITY ASSURANCE

- A. For products or quality of work specified by association, trade, or federal standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents.
- C. General Applicability of Standards: Except where Contract Documents include more stringent requirements, applicable standards of the construction industry have the same force and effect as if bound or copied directly into Contract Documents.
- D. Such standards are made a part of the Contract Documents by reference.
- E. Individual sections indicate which codes and standards the Contractor must keep at the project site, available for reference.
- F. Referenced industry standards take precedence over standards which are not referenced but recognized in industry as applicable.
- G. Non-referenced standards are not directly applicable to the Work, except as a general requirement of whether the Work complies with standards recognized in the construction industry.

##### 1.03 LOCATION OF REFERENCES

- A. Valley Library, Oregon State University.

##### 1.04 SCHEDULE OF REFERENCED ASSOCIATIONS

AIA            American Institute of Architects

	<a href="http://WWW.AIA.ORG">WWW.AIA.ORG</a>
AISC	American Institute of Steel Construction <a href="http://WWW.AISC.ORG">WWW.AISC.ORG</a>
AISI	American Iron and Steel Institute <a href="http://WWW.STEEL.ORG">WWW.STEEL.ORG</a>
ANSI	American National Standards Institute <a href="http://WWW.ANSI.ORG">WWW.ANSI.ORG</a>
APA	American Plywood Association <a href="http://WWW.APAWOOD.ORG">WWW.APAWOOD.ORG</a>
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers <a href="http://WWW.ASHRAE.ORG">WWW.ASHRAE.ORG</a>
ASTM	American Society for Testing and Materials <a href="http://WWW.ASTM.ORG">WWW.ASTM.ORG</a>
AWPA	American Wood Protection Association <a href="http://WWW.AWPA.COM">WWW.AWPA.COM</a>
AWS	American Welding Society <a href="http://WWW.AWS.ORG">WWW.AWS.ORG</a>
BIA	Masonry Institute of America <a href="http://WWW.MASONRYINSTITUTE.ORG">WWW.MASONRYINSTITUTE.ORG</a>
BOLI	Oregon Bureau of Labor and Industries <a href="http://WWW.BOLI.STATE.OR.US">WWW.BOLI.STATE.OR.US</a>
CCB	Construction Contractors Board <a href="http://WWW.OREGON.GOV.CCB/">WWW.OREGON.GOV.CCB/</a>
CDA	Copper Development Association <a href="http://WWW.COPPER.ORG">WWW.COPPER.ORG</a>
CISPI	Cast Iron Soil Pipe Institute <a href="http://WWW.CISPI.ORG">WWW.CISPI.ORG</a>
CSI	Construction Specification Institute <a href="http://WWW.CSINET.ORG">WWW.CSINET.ORG</a>
DEQ	Department of Environmental Quality (Oregon) <a href="http://WWW.OREGON.GOV/DEQ/">WWW.OREGON.GOV/DEQ/</a>

DHI	Door and Hardware Institute <a href="http://WWW.DHI.ORG">WWW.DHI.ORG</a>
DOT	Department of Transportation <a href="http://WWW.DOT.GOV">WWW.DOT.GOV</a>
EPA	U.S. Environmental Protection Agency <a href="http://WWW.EPA.GOV">WWW.EPA.GOV</a>
FM	Factory Mutual System <a href="http://WWW.FMGLOBAL.COM">WWW.FMGLOBAL.COM</a>
FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) <a href="http://WWW.GSA.GOV/PORTAL/CONTENT/103856">WWW.GSA.GOV/PORTAL/CONTENT/103856</a>
IBC	International Building Code <a href="http://WWW.ICCSAFE.ORG">WWW.ICCSAFE.ORG</a>
ICBO	International Conference of Building Officials <a href="http://PUBLICCODES.CITATION.COM/ICOD/IBG/INDEX.HTM">PUBLICCODES.CITATION.COM/ICOD/IBG/INDEX.HTM</a>
IRS	Internal Revenue Service <a href="http://WWW.IRS.GOV">WWW.IRS.GOV</a>
ISA	Instrumentation Systems and Automation Society <a href="http://WWW.ISA.ORG">WWW.ISA.ORG</a>
NAAMM	National Association of Architectural Metal Manufacturers <a href="http://WWW.NAAMM.ORG">WWW.NAAMM.ORG</a>
NBFU	National Board of Fire Underwriters <a href="http://WWW.NFPA.ORG">WWW.NFPA.ORG</a>
NEC	National Electric Code <a href="http://WWW.NECPLUS.ORG">WWW.NECPLUS.ORG</a>
NEMA	National Electrical Manufacturers' Association <a href="http://WWW.NEMA.ORG">WWW.NEMA.ORG</a>
NESC	National Electrical Safety Code <a href="http://WWW.IEEE.ORG">WWW.IEEE.ORG</a>
NFPA	National Fire Protection Association <a href="http://WWW.NFPA.ORG">WWW.NFPA.ORG</a>

NRCA	National Roofing Contractors' Association WWW.NRCA.NET
OAR	Oregon Administrative Rules ARCWEB.SOS.STATE.OR.US/404.HTML
OESP	State of Oregon Electrical Specialty Code <a href="http://www.bcd.oregon.gov/programs/online_codes.html">http://www.bcd.oregon.gov/programs/online_codes.html</a>
ORS	Oregon Revised Statutes LANDRU.LEG.STATE.OR.US/ORS/
OSHA	Occupational Safety and Health Administration WWW.OSHA.GOV
OSSC	Oregon Structural Specialty Code <a href="http://www.bcd.oregon.gov/programs/online_codes.html">http://www.bcd.oregon.gov/programs/online_codes.html</a>
PS	Product Standard STANDARDS.GOV/STANDARDS.CFM
SDI	Steel Door Institute WWW.STEELDOOR.ORG
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association WWW.SMACNA.ORG
SPRI	Single Ply Roofing Institute WWW.SPRI.ORG
SSPC	Steel Structures Painting Council WWW.SSPC.ORG
SWRI	Sealing, Waterproofing and Restoration Institute WWW.SWIRONLINE.ORG
UBC	Uniform Building Code (See ICBO)
UFC	Uniform Fire Code WWW.NFPA.ORG
UL	Underwriters' Laboratories, Inc. WWW.UL.COM
UMC	Uniform Mechanical Code WWW.UBC.COM

UPC      Uniform Plumbing Code  
          WWW.UBC.COM

WHL      Warnock Hersey Laboratories  
          WWW.INTEK.COM/MARKS/WH/

WCLIB    West Coast Lumber Inspection Bureau  
          WWW.WCLIB.ORG

WWPA    Western Wood Products Association  
          [WWW.WWPA.ORG](http://WWW.WWPA.ORG)

**END OF SECTION**

## SECTION 01 45 00

### QUALITY CONTROL

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Codes, regulations and permits.
- B. Procedures for quality control.

##### 1.02 OWNER RESPONSIBILITIES

- A. Owner will employ and pay for services of an independent testing laboratory to perform inspection, sampling and testing as required by local building authority.
- B. Owner's Authorized Representative will provide on-site observation during construction.

##### 1.03 CODES, REGULATIONS AND PERMITS

- A. All Work shall conform with the Oregon Structural Specialty Code (OSSC) based on the International Building Code (IBC), as amended by the State of Oregon Building Codes Division and the edition designated by the governing authority.
- B. Contractor shall comply with all applicable state and local construction codes.
- C. References to codes, Specifications and standards referred to in the Contract Documents shall mean, and are intended to be, the latest edition, amendment or revision of such reference standard in effect as of the date of these Contract Documents.
- D. The Owner shall be responsible for all permits and City of Corvallis plan review fees; the Contractor shall be responsible for all licenses and associated fees required for the Project.
- E. Contractor shall arrange and attend all required permit inspections and furnish evidence of approved City inspection reports per Section 01 77 00.

##### 1.04 QUALITY OF WORK

- A. It is the true and specific intent of these Specifications that quality of Work on all phases of the construction and embracing all the trade sections shall be of high quality performed by workers skilled in their trade and performing their Work only according to the standard of best practice of the trade.
- B. All manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with manufacturer's directions unless otherwise specified.
- C. If Work is required in a manner to make it impossible to produce first quality Work, or should discrepancies appear among Contract Documents, request interpretation from

Architect before proceeding with Work.

- D. Failure to secure interpretation may cause rejection by Architect or owner of installation.

#### **1.05 LAYOUT**

- A. Be responsible for properly laying out the Work and for lines and measurements for the Work.
- B. Verify the figures shown on the drawings before laying out the Work and report errors or inaccuracies to the Architect before commencing Work.
- C. Strict compliance with maximum slopes is required. Accessible parking spaces and adjacent access aisles with slope exceeding 2% in any direction, as determined by OSU, shall be removed and replaced by the contractor at their expense.
- D. Strict compliance with maximum slopes is required. New sidewalks exceeding 1:20 slope or with cross slope exceeding 2%, as determined by OSU, shall be removed and replaced by the contractor at their expense. Ramps exceeding 1:16 slope or with cross slope exceeding 2%, as determined by OSU, shall be removed and replaced by the contractor at their expense.

#### **1.06 SUPERVISION**

- A. The Contractor shall maintain effective supervision on the project at all times Work is being performed.
- B. The superintendent shall be the same person throughout the project and shall attend the preconstruction conference.

#### **1.07 INSPECTIONS AND TESTING**

- A. Contractor shall notify the Owner at least twenty-four (24) hours in advance of any required progress inspection or final inspection including final punch list inspection.
- B. Cooperate with laboratory personnel, provide access to Work and furnish incidental equipment material and labor required for field testing and sample taking.

#### **1.08 EVALUATION OF TESTS AND INSPECTIONS**

- A. Results of laboratory and/or field control tests and inspections shall be the principal basis upon which satisfactory completion of Work shall be judged.
- B. If results of tests and inspections indicate Work is below requirements of Contract Documents, that portion of Work is subject to rejection.

#### **1.09 ADJUSTMENTS**

- A. Remove and replace Work so rejected at Contractor's expense including costs of subsequent tests and inspections until Work meets requirements of Contract Documents.

- B. The Owner reserves the right to perform any testing as may be required to determine compliance with the Contract Documents.
- C. Costs for such testing will be the Owner's responsibility unless testing indicates noncompliance. Cost for such testing indicating noncompliance shall be borne by the Contractor.
- D. Noncomplying Work shall be corrected and testing will be repeated until the Work complies with the Contract Documents.
- E. Contractor will pay costs for retesting noncomplying Work.

**END OF SECTION**



## SECTION 01 51 00

### CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

##### 1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
- B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition".
- C. Electrical Service: Comply with NEMA, NEC and UL standards and regulations for temporary electric service; install service in compliance with National Electric Code (NFPA 70).
- D. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use; obtain required certifications and permits if required.

##### 1.03 PROTECTION

- A. Protect sidewalks, asphalt paving, concrete, trees, shrubs, and lawn areas at all times from damage resulting from construction activities.
- B. Prevent materials from clogging catch basins and yard drains; leave drains clean and in proper working condition.
- C. Protect Existing Irrigation Systems:
  - 1. In the event damage occurs to an underground irrigation system as a direct result of a Contractor's activities, the Contractor shall repair/replace or be assessed a charge at the discretion of the Owner.
  - 2. If repairs are to be made by the Contractor, the repairs will be inspected by the Owner's Authorized Representative prior to backfilling.
  - 3. Any galvanized pipe that requires repair shall be repaired at a threaded coupling, not by use of a compression coupling.
- D. Protect Existing Air Handling Systems:
  - 1. Contractor shall be responsible for protection of the cleanliness of the existing air handling system at all times. This protection shall include:
    - a. During site work or building demolition, prefilters shall be provided and maintained on all building outside air intakes at all times throughout the construction duration.

- b. During any interior work that may create dust in the interior space and adjacent corridor/hallways, air filters shall be provided and maintained on all affected air return and exhaust grilles. Where air flow in or out of the space is not required, all air duct openings shall be temporarily blanked off with plywood or sheet metal.
  - c. Prior to starting any work, the Contractor shall record and submit to the Owner's Authorized Representative, pressure readings across all existing air handler air filter banks before installation of new prefilters.
  - d. Upon completion of all Work affecting existing air handling systems, the Contractor shall remove all temporary filters, covers and associated parts and restore the system to its original operating condition unless otherwise stated elsewhere in the Contract Documents
- E. Clean, repair, resurface, or restore existing surfaces to their original, or better, condition, or completely replace such surfaces to match existing, where damaged by construction operations.
- F. Security is the responsibility of the Contractor.
- G. Construction Debris:
- 1. Debris shall not be allowed to remain around the buildings during performance of Work, but shall be disposed of as rapidly as it accumulates.
  - 2. On completion of Work, the buildings and grounds shall be left in a condition that is equal to or better than original condition.
  - 3. In case of failure to do so, the Owner may remove rubbish and charge the cost to the Contractor.
- H. The Contractor shall manage a safe job environment for both the safety of all the people around the Work site as well as the safety of the Owner's and general public's property.
- I. The Contractor shall provide and maintain suitable barricades, shelters, lights, and danger signals during the progress of the Work; they shall meet the requirements of the local building code and OSHA.

#### **1.04 DRAINAGE**

- A. Verify that all rain drains in the construction areas are in working order and notify the Owner's Authorized Representative in writing of any rain drains that are plugged, prior to the start of the Work.
- B. Start of Work will be considered as acknowledgment that all drains are clear and in good working order.
- C. All drains shall be left in a clean and proper working condition.

#### **1.05 CONSTRUCTION PROJECT SAFETY FORM**

- A. Contractor shall submit to the Owner, prior to signing the Contract, the completed

"Construction Project Safety Form", which is provided with instructions at the end of this Section.

## **1.06 TEMPORARY UTILITIES**

- A. Temporary Utilities:
  - 1. Prepare a schedule indicating dates for implementation and termination of each temporary utility.
  - 2. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of the permanent service.
- B. Conditions of Use:
  - 1. Keep temporary services and facilities clean and neat in appearance.
  - 2. Operate in a safe and efficient manner.
  - 3. Take necessary fire prevention measures.
  - 4. Do not overload facilities or permit them to interfere with progress.
  - 5. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.
- C. Electrical Service:
  - 1. Service limited to 20 amp 120V circuits will be paid for by the Owner.
  - 2. Connection to the service shall be the responsibility of the Contractor, with the Owner's approval.
  - 3. Coordinate with the Owner's Authorized Representative.
- D. Water Service:
  - 1. Service in reasonable quantities for the Project will be paid for by the Owner.
  - 2. Connection to the service shall be the responsibility of the Contractor, with the Owner's approval.
  - 3. Coordinate with the Owner's Authorized Representative.

## **1.07 TEMPORARY SUPPORT FACILITIES**

- A. Temporary Sanitary Facilities:
  - 1. Provide and maintain an adequate number of facilities for the use of all persons employed on the Work during construction.
  - 2. Provide enclosed, weatherproof facilities with heat as required.
  - 3. Use of new or existing Owner's facilities will not be permitted.
- B. Temporary Heat and Ventilation:
  - 1. As necessary, provide temporary heat and ventilation required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

- C. Telephone Equipment: Provide telephone communications at project site.
- D. Existing Services:
  - 1. Do not interrupt any existing service.
  - 2. Prior request and approval of the Owner's Representative will enable the Owner to shut down any utility required by the Work.
  - 3. Contractor shall not shut down utilities.

#### **1.08 TEMPORARY BARRIERS AND ENCLOSURES**

- A. Provide barriers and fencing to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage.
- B. Provide Commercial grade chain link fence construction.
- C. Provide 6 foot high fence around construction site as directed by Owner's Authorized Representative; equip with vehicular and pedestrian gates with lock.
- D. Exterior Closures: Provide temporary secured, weather-tight closures at exterior openings, to permit acceptable working conditions and protection of the Work.
- E. Interior Closures:
  - 1. Provide temporary floor to ceiling partitions (not plastic sheeting) and ceilings as required to separate work areas from Owner occupied areas, to prevent penetration of dust and moisture into Owner occupied areas, to reduce construction noise, and to prevent damage to existing materials and equipment.
  - 2. Paint surfaces exposed to view from Owner occupied areas.

#### **1.09 ODORS**

- A. Work that causes excessive odors shall be performed only after coordination with the Owner's Authorized Representative. Filtering of air intakes to units may be required to prevent odors and vapors from entering the buildings.
- B. Contractor shall provide 7 days advance notice to the Owner's Authorized Representative in order for advance notice to be forwarded to building occupants. Work stoppage may occur if advance notification has not been coordinated or odors and vapors from the work are found to generate complaints from building occupants.

#### **1.10 FIRE SAFETY**

- A. Ensure that required exit routes remain unobstructed while building is occupied.
- B. Abide by all fire safety requirements for buildings under construction, alteration or demolition as required by Article 87, of the Uniform Fire Code as adopted by the State of Oregon.
- C. An emergency telephone shall be provided on site. Cellular telephone equipment is acceptable.
- D. Fire Suppression Equipment:

1. Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers", and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".
2. Maintain equipment in working condition with current inspection certificate attached to each.
3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
4. Store combustible materials in containers in fire-safe locations.
5. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
- 6.
6. Provide continual supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
7. When possible, relocate hot work to a designated hot work area.
8. If the materials or equipment cannot be relocated to a designated hot work area, use the least hazardous form of hot work that will get the job done and prepare the area properly.
9. Manage mobile hot work using the formal hot work permit system. (mentioned in the next bullet point and also a directive in the OSU Hot Work Safety Program)
10. Make sure both fire protection and hot work equipment work properly.
11. Train all personnel involved in hot work operations and activities so that they have the understanding, knowledge, and skills necessary to safely perform their jobs.

#### **1.11 CONSTRUCTION AIDS**

- A. Scaffolding: comply with applicable OSHA requirements.
- B. Material Handling Equipment:
  1. Provide necessary cranes, hoists, towers, or other lifting devices.
  2. Use only experienced operators.
  3. Remove equipment as soon as possible after task is ended.
  4. Coordinate placement of such equipment with Owner's Authorized Representative.
  5. Obtain required permits and meet requirement of governing authorities regarding applicable regulations.
- C. Materials or debris shall not be allowed to free fall from building.
- D. The use of chutes or conveyors must be approved by Owner.

#### **1.12 TEMPORARY CONTROLS**

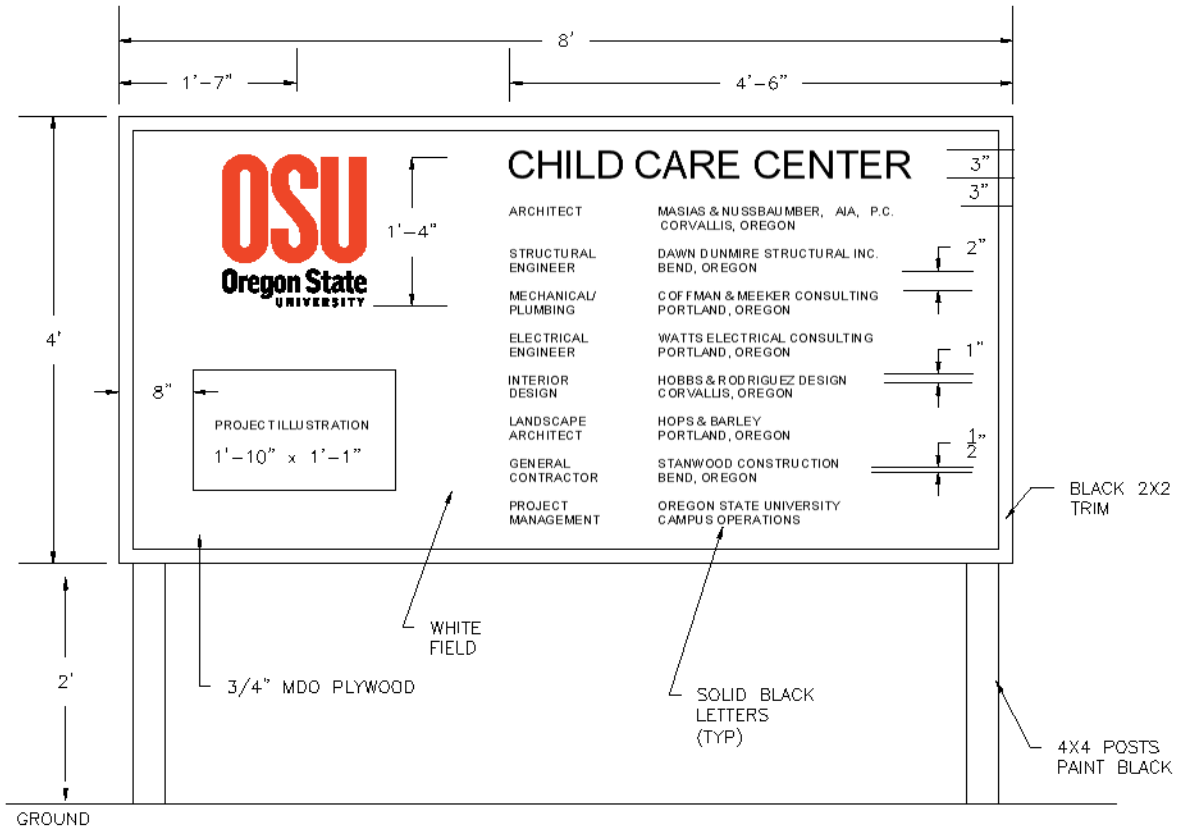
- A. Water Control:
  1. Maintain excavations free of water.
  2. Provide, operate, and maintain necessary pumping equipment.

- B. Protection:
  - 1. Protect installed Work and provide special protection where specified in individual specification sections.
  - 2. Prohibit traffic or storage upon waterproofed or roofed surfaces.
- C. Security:
  - 1. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism, or theft.
  - 2. Coordinate operations with Owner's Authorized Representative.
- D. Temporary Traffic Control /Pedestrian Accessibility
  - 1. A continuous route for all pedestrians, including persons with disabilities and bicyclists, shall be maintained at all times. When existing pedestrian facilities are disrupted, closed, or relocated in a construction zone, temporary pedestrian facilities shall be provided.
  - 2. Temporary pedestrian facilities should be safe and accessible. There should be no curbs or abrupt changes in grade that could cause tripping or be a barrier to wheelchair use.
  - 3. Signage shall be provided directing people to the temporary accessible route. The signage shall include the International Symbol of Accessibility.
  - 4. Contractors shall not block temporary walkways with vehicles, equipment, construction materials, signs, trash, or other objects that might prohibit pedestrian passage.
  - 5. Construction equipment and equipment operation must be separated from any open walkways. At construction zones, pedestrian fences or other protective barriers shall be provided to prevent access into the construction zone.

### **1.13 PROJECT SIGNAGE**

- A. Contractor is permitted to post only one project identification sign based on the following example:

## OSU TYPICAL JOB SIGN



### 1.14 PREPARATION

- Consult with Owner to review jobsite areas required for field offices, material storage and stockpiles, equipment storage, access to different locations, etc.

### 1.15 PERFORMANCE

- Confine equipment, apparatus, and storage of material to work limits. The Owner will not be responsible for protection of materials and equipment from damage, pilfering, etc.
- Install temporary facilities in such a manner that the installed work will not be damaged.
- Do not use facilities of existing building unless authorized in writing by the Owner.
- Effective September 1, 2012, OSU became a non-smoking campus and smoking is prohibited on all Campus property.
- Keep facilities well maintained.
- Relocate temporary facilities as required during job progress.

- G. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
1. Replace air filters and clean inside of ductwork and housings.
  2. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
  3. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

**END OF SECTION**



# Oregon State University Construction and Maintenance Safety Requirements

EH&S, 130 Oak Creek Building, Corvallis, OR 97331-7405, (541) 737-2505,  
FAX (541) 737-9090

**Complete OSU Construction and Maintenance Safety Form** - Send completed documents (including Site Safety Plan and all separate answer pages) to Construction Contract Administration along with the signed contract and bonds.

**Project Isolation** - All construction and remodeling activities regardless of size and/or scope must be fenced, barricaded, or otherwise protected to restrict entrance and to ensure the safety of those in the general area. See isolation requirements.

**Site Safety Plan** - A site safety plan will be required and will address:

- General Information
- Emergency Information
- Key Organization Personnel
- Hazard Evaluation/Facility Impact
- Emergency Procedures
- Work Zones
- Security Measures
- Fire Protection

A model plan is attached. This form can be used if another plan has not already been prepared. Contact OSU Environmental Health & Safety for more information 737-2505.

## Isolation Requirements

**General:** All construction, maintenance, and remodeling activities, regardless of size or scope, must be fenced, barricaded, or otherwise isolated to restrict entrance and to ensure the safety of those in the general area.

**Outdoor Activities:** Outdoor projects require the following perimeter isolation:

- A six foot chain-link fence, with controlled access points, extending in all directions around the excavation or building site such that no area of the construction is accessible to pedestrians or unauthorized personnel or vehicles.
- Isolation area will include vehicle loading and unloading areas.
- At the University's option, other barricading plans may be accepted. These may apply to projects such as road resurfacing, parking lot striping, exterior building water proofing, deliveries, etc. Contact EH&S regarding other barricading plans.

**Overnight:** Any excavation across or adjacent to sidewalks or pathways which must be left open overnight, must be identified with working, blinking construction lights in addition to solid barricades

**Indoor Activities:** Indoor construction or maintenance projects which will create dust, potentially hazardous fumes or vapors, or offensive odors are subject to the following isolation:

- Areas where existing doors can provide isolation will be labeled "Construction Area--Authorized Personnel Only".

- All other areas will be isolated by a solid barrier. The minimum barrier allowed is 4 mil poly sheeting sealed to prevent migration of dust.
- Mechanical ventilation may be required.
- A solid wall is required if building envelope is opened to the outside.

**Contractor Responsibilities**

- The contractor will provide all barricading, isolation, and fencing material. OSU will not provide any materials.
- The contractor will also provide all appropriate warning and detour signs when sidewalks, exits, or roads are closed.
- Contractor will provide all other construction area signs.

**OSU Construction and Maintenance Safety Form**

**Send completed safety documents to Construction Contract Administration with contract and bonds.**

Date: \_\_\_\_\_ Project: \_\_\_\_\_

Start Date: \_\_\_\_\_ Completion date: \_\_\_\_\_

Contractor: \_\_\_\_\_ Contact: \_\_\_\_\_

Work # \_\_\_\_\_ 24 hr #: \_\_\_\_\_

OSU Project Mgr: \_\_\_\_\_ Work / 24hr #'s: \_\_\_\_\_

Dept Contact: \_\_\_\_\_ OSU EH&S Contact: \_\_\_\_\_

Preconstruction meeting? **Y N** Date/Time/Location: \_\_\_\_\_

**For the following items, prepare answers on a separate sheet for all items marked "Yes". Precede each answer with the appropriate item number. All boxes need to be checked**

<b>Y</b>	<b>N</b>	<b>For This Project</b>	<b>If YES, then:</b>
		<b>1</b> Will any confined spaces be accessed?	Describe location of entry Specify location of permit Notify EH&S prior to entry See SAF 209
		<b>2</b> Will hot work be performed (welding, cutting, brazing, etc.)?	Provide min. 5# 2A10BC extinguisher within 10 ft If indoors - provide and describe ventilation See SAF 214
		<b>3</b> Any products brought to campus?	Provide MSDS on site prior to first use; Make available to OSU on request
		<b>4</b> Will lead paint be impacted?	Describe plan to limit contamination
		<b>5</b> Will asbestos-containing-material be impacted?	Coordinate with OSU asbestos manager
		<b>6</b> Will <u>any</u> materials (construction debris, soil, water, etc) be removed from campus?	Describe in detail identity and disposition of material (how, where)
		<b>7</b> Any open trenches or holes?	Describe isolation procedures (see Page 1)
		<b>8</b> Will a crane be used?	Describe crane safety plan (include plan to prevent loads above occupied areas)
		<b>9</b> Is this project building a new facility, a major remodel?	Provide Site Safety plan Describe isolation procedures (see Page 1)
		<b>10</b> Is this a minor remodeling project?	Provide, or fill out model Site Safety Plan form ( see Page 3) Describe isolation procedures (see Page 1)
		<b>11</b> Will air contamination be produced (e.g. dust, CO, solvent vapors, VOCs, odors)?	Describe project ventilation and isolation Indicate position of building air intake(s)
		<b>12</b> Will there be noise > 85 dB?	Describe noise minimization plan
		<b>13</b> Will this project use a scaffold or an external chute?	Describe isolation, dust control, installation
		<b>14</b> Will this project involve a working surface >6' above a lower level	Describe fall protection
		<b>15</b> Will any "blind" saw-cuts or penetrations be made in existing foundations, floors, ceilings and/or walls?	Describe plan for detecting and protecting power lines or other building utility lines.

EH&S Review: \_\_\_\_\_ Date: \_\_\_\_\_

# Model Site Safety Plan

## 1. General Information

Contractor name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City, State, Zip \_\_\_\_\_  
 Site Safety Officer \_\_\_\_\_ Project Dates \_\_\_\_\_  
 Project Name \_\_\_\_\_

## 2. Emergency Information

Emergency Response	911	OSU EH&S and OSU Facilities Services must be notified in the event of an emergency
Hazardous Materials Spill		
MSDS on-site location		
OSU EH&S	(541) 737-2505	
Facilities Services	(541) 737-2969	

## 3. Contractor Key Personnel

	Name	Phone	Emergency Contact
Company Owner			
Project Manager			
Job Supervisor			
Site Safety Officer			
Other Responsible Individual			
24 Hour Notification			

List of employees on site \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4. Hazard Evaluation/ Facility Impact	
Physical	Yes / No
Heavy Equipment	
Noise	
Heat	
Elevation	
Radiation Materials	
Excavations	
Underground Utilities	
Confined Spaces	
Fire Prevention	
Electrical	

5. Emergencies
Services
Evacuation Route
First Aid Location
Hazardous Materials Spill Procedure

## 6. Work Zones

Material Storage \_\_\_\_\_  
 Parking locations \_\_\_\_\_  
 Individuals with OSU keys \_\_\_\_\_  
 Access issues \_\_\_\_\_

## 7. Security measures

\_\_\_\_\_  
 \_\_\_\_\_

## 8. Fire protection

## SECTION 01 56 39

### TREE AND PLANTING PROTECTION

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Section includes temporary fencing, barricades, and guards to protect trees, plants and groundcovers not indicated to be removed, as necessary and required to prevent damage above and below grade.

##### 1.02 DEFINITIONS

- A. Dripline: Outer perimeter of branches of any tree or plant.
- B. Groundcover: Includes but not limited to plants and grass.

##### 1.03 PERFORMANCE REQUIREMENTS

- A. The Contractor shall exercise utmost care to protect existing trees and plants designated to remain and shall comply with all protection requirements provided by Owner and City of Corvallis as conveyed through the Owner's Authorized Representative.
- B. The Contractor shall install tree protection fencing as detailed and shall prevent damage to shrubs, groundcover, trees, root systems, soil, bark, foliage, branches and limbs due to construction activities, including but not limited to:
  - 1. Soil contamination, erosion, and compaction.
  - 2. Excessive wetting, and ponding due to storm water, and construction run-off.
  - 3. Alteration of grade, stockpiling of soil, debris, and materials.
  - 4. Damage to soil, roots, bark, trunk, limbs, branches, and foliage.
  - 5. Prevent unauthorized cutting, breaking, skinning and bruising of roots, branches, and bark.

##### 1.04 SUBMITTALS

- A. Procedural proposal for tree and plant protection, describe methods of protection, and stabilization, provide drawings and supporting documentation as directed.
- B. Contractor's Condition Inspection; include written report and color photographs.

##### 1.05 PROJECT CONDITIONS

- A. Install protection during initial mobilization at the Work site, and maintain until substantial completion.
- B. If, in the opinion of the Owner's arborist, additional protection is required, the Contractor shall install additional fencing as directed and without cost to the Owner.
- C. The location and requirements for additional fencing shall be determined by the

Owner's arborist prior to, and at any time during the course of the Work.

- D. Fencing:
  - 1. Fencing shall be installed at the tree and plant protection areas as detailed on Plans, or as directed by the Owner's Authorized Representative.
  - 2. Tree and plant protection fences shall remain in place until all Work is completed and shall not be removed or relocated without the approval of the Owner's Authorized Representative.
- E. Driving and Parking:
  - 1. Not permitted off paved surfaces without the approval of the Owner's Authorized Representative.
  - 2. When approved, the Contractor shall place plywood of sufficient thickness and width to support vehicles and prevent rutting on the area to be driven on.
  - 3. Care shall also be taken with respect to existing lawn sprinkler systems.
- F. Storage of materials and Debris: Not permitted off paved surfaces.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURED COMPONENTS**

- A. Chain Link Fencing: 11 gage galvanized chain link, six feet. tall, and 1.5 inch inside diameter galvanized steel line posts and 2.5 inch inside diameter corner posts, provide lockable gates as necessary.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verification of Conditions: Inspect trees, plants, and groundcovers, document existing conditions prior to installation of protection.

### **3.02 EXECUTION**

- A. Pruning and Cutting of Roots, Branches and Foliage:
  - 1. Review conditions with Architect or Owner prior to need for work, and proceed as directed.
  - 2. All pruning to be done by Owner's landscape maintenance personnel or ISA Certified arborist under the direction of Owner's Landscape Management Department.
  - 3. Perform pruning and cutting with sharp instruments intended for the purpose; do not break or chop.
- B. Root Cuttings:
  - 1. Carefully and cleanly cut roots and branches of trees indicated to be left standing

- where such roots and branches obstruct new construction.
2. Protect exposed roots with wet burlap until they can be covered with soil.
- C. Excavation and Trenching Within Drip Lines:
1. Permitted where indicated, and at other specifically approved locations.
  2. Tunnel under or around roots by hand digging or boring.
  3. Do not cut main lateral roots and tap roots over one inch diameter; cut smaller roots which interfere with installation of new Work.
  4. Do not allow exposed roots to dry out before permanent backfill is placed; provide temporary earth cover, or pack with peat moss and wrap with burlap.
  5. Water and maintain roots in moist condition and temporarily support and protect from damage until permanently relocated and covered with backfill.
- D. Existing Grading: Maintain within drip line of trees and plants unless otherwise indicated on the drawing and approved by the Owner's Authorized Representative.
- E. Tree Protection:
1. Provide temporary fence complying with Section 01 51 00 for protection of trees to remain.
  2. Extend fencing ten feet beyond dripline, except where greater distance is required for protection of Elm trees.
  3. Prevent entry into protected areas except as authorized in writing by the Owner's Authorized Representative.

### **3.03 REPAIR AND REPLACEMENT OF TREES AND PLANTS**

- A. Repair trees or shrubs damaged by construction operations as directed by the Owner.
- B. Make repairs promptly after damage occurs to prevent progressive deterioration of damaged trees.
- C. Damaged Trees, Shrubs and Groundcover:
1. Replace where Owner's Authorized Representative determines restoration to normal growth pattern is not possible; plant and maintain as directed.
  2. Replacement trees up to 13 inches caliper and shrubs up to 4 feet tall: Same size as damaged tree or shrub, species selected by the Owner's Authorized Representative.
  3. Trees over 13 inch caliper and shrubs greater than 4 feet tall: Compensate Owner as determined by an acceptable consulting arborist registered with the American Society of Consulting Arborists.
  4. Replacement groundcovers: Same size and quality as damaged species selected by Owner's Authorized Representative.

**END OF SECTION**

## SECTION 01 60 00

### PRODUCT REQUIREMENTS

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Summary:
  - 1. Product options.
  - 2. Owner-furnished products.
  - 3. Product delivery, storage and handling.

##### 1.02 PRODUCTS

- A. Products:
  - 1. New material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work.
  - 2. Products may also include existing materials or components specifically identified for reuse.
- B. Use interchangeable components of the same manufacture for similar components.
- C. Unless otherwise specified, all material and equipment shall be new; free from defects impairing strength, durability, and appearance; of current manufacture.
- D. Items specified shall be considered minimum as to quality, function, capacity, and suitability for application intended.
- E. Items incorporated into the Work shall conform to applicable specifications and standards designated, and shall be of size, make, type, and quality specified.
- F. Design, fabricate, and assemble in accordance with current best engineering, industry, and shop practices.
- G. Manufacture like parts of duplicate units to standard size and gauge to make them interchangeable.
- H. Two or more items of the same kind shall be identical and made by the same manufacturer.

##### 1.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
- C. Products Specified by Naming One [or More] Manufacturer[s]: Products of manufacturer[s] named and meeting specifications, no options or substitutions



allowed.

D. Substitution Procedure: Under Section 01 25 00.

#### **1.04 REUSE OF EXISTING PRODUCTS**

- A. Except as specifically indicated or specified, materials and equipment removed from existing construction shall not be used in the completed Work.
- B. For material and equipment specifically indicated or specified to be reused in the Work:
  - 1. Use care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
  - 2. Arrange for transportation, storage, and handling of products which require off-site storage, restoration, or renovation.
  - 3. Remove and reinstall mechanical units, vents, guys, antennae, and electrical and grounding wires or conduits.

#### **1.05 OWNER FURNISHED PRODUCTS**

- A. Designate delivery dates of Owner-furnished items in the construction schedule.
- B. Receive, unload, store and handle Owner-furnished items at the site; protect from damage.

#### **1.06 DELIVERY, STORAGE AND HANDLING**

- A. Transport, handle, store and protect products in accordance with manufacturer's instructions.
- B. Arrange deliveries in accordance with construction schedules; coordinate to avoid conflict with Work and site conditions.
- C. Deliver and store products in undamaged condition in manufacturer's original containers or packaging with identifying labels intact and legible.
- D. Inspect shipments to assure compliance with Contract Documents and reviewed submittals, and that products are undamaged.
- E. Prevent soiling or damage to products or packaging.
- F. Interior Storage: Maintain required temperature and humidity ranges. Verify that Owner furnished storage meets product manufacturer's requirements.
- G. Exterior Storage:
  - 1. Store materials above ground to prevent soiling and/or moisture infiltration.
  - 2. Cover materials with waterproof breathable sheet coverings; provide adequate ventilation.
  - 3. All storage locations to be approved in advance by the Owner.
- H. Arrange storage to provide access for inspection.
- I. Coordinate with Owner's Authorized Representative all on-site storage activities.

J. Provide for security of stored products.

**END OF SECTION**

## SECTION 01 73 29

### CUTTING AND PATCHING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Requirements and limitations for cutting and patching of Work.

##### 1.02 RELATED SECTIONS

- A. Section 01 25 00, Product Substitution Procedures.
- B. Section 01 33 23, Shop Drawings, Product Data, Samples

##### 1.03 SUBMITTALS

- A. Submit written request in advance of cutting or alteration which affects:
  - 1. Structural integrity of any element of the Work.
  - 2. Efficiency, maintenance, or safety of any operational element.
  - 3. Visual qualities of sight exposed elements.
  - 4. Work of Owner or separate contractor.
- B. Include in request:
  - 1. Identification of project.
  - 2. Location and description of affected work.
  - 3. Necessity for cutting or alteration.
  - 4. Description of proposed work, and products to be used.
  - 5. Alternatives to cutting and patching.
  - 6. Effect on work of Owner or separate contractor.
  - 7. Written permission of affected separate contractor.
  - 8. Date and time work will be executed.

#### PART 2 PRODUCTS

##### 2.01 MATERIALS

- A. Primary Products: Those required for original installation.
- B. Product Substitution: For any proposed change in materials, submit request for substitution under provisions of Section 01 25 00.

#### PART 3 EXECUTION

##### 3.01 EXAMINATION

- A. Inspect existing conditions prior to commencing Work, including elements subject to

damage or movement during cutting and patching.

- B. After uncovering existing work, inspect conditions affecting performance of Work.
- C. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Provide temporary supports to ensure structural integrity of the Work.
- B. Provide devices and methods to protect other portions of the Work from damage.
- C. Provide protection from elements for areas which may be exposed by uncovering work.

### **3.03 CUTTING AND PATCHING**

- A. Execute cutting, fitting and patching to complete work.
- B. Fit products together, to integrate with other work.
- C. Remove and replace defective or non-conforming work.
- D. Provide openings in the work for penetration of mechanical and electrical work.

### **3.04 PERFORMANCE**

- A. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
- B. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval from Owner's Authorized Representative.
- C. Restore work with new products in accordance with requirements of Contract Documents.
- D. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with approved fire rated material, to full thickness of the penetrated element.
- E. Refinishing:
  - 1. Refinish surfaces to match adjacent finish.
  - 2. For continuous surfaces, refinish to nearest intersection or natural break.
  - 3. For an assembly, refinish entire unit.

**END OF SECTION**

## SECTION 01 74 00

### CLEANING

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. Related requirements specified elsewhere, cleaning for specific products or work: Specification section for that work.
- B. Maintain premises and public properties free from accumulations of waste, debris, and rubbish, caused by operations.
- C. At completion of Work remove waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all sight-exposed surfaces; leave project clean and ready for occupancy.

##### 1.02 QUALITY ASSURANCE

- A. Standards: Maintain project in accord with applicable safety and insurance standards.
- B. Hazard Control:
  - 1. Store volatile wastes in covered metal containers.
  - 2. Provide adequate ventilation during use of volatile or noxious substances.

##### 1.03 MATERIALS

- A. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- B. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

##### 1.04 DURING CONSTRUCTION:

- A. Wet down dry materials and rubbish to lay dust and prevent blowing dust.
- B. At reasonable intervals during progress of Work clean site and public properties, and dispose of waste materials, debris and rubbish.
- C. Provide on-site containers for collection of waste materials, debris and rubbish.
- D. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner's property.
- E. Vacuum clean interior building areas when ready to receive finish painting, and continue vacuum cleaning on an as-needed basis until project is ready for Substantial Completion or occupancy.
- F. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.

### **1.05 FINAL CLEANING**

- A. Employ experienced workers, or professional cleaners, for final cleaning.
- B. In preparation for Substantial Completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- C. Remove grease, dust, dirt, stains, labels, and other foreign materials from exposed interior and exterior finished surfaces.
- D. Remove putty, paint, labels, lubricants, etc., from windows, mirrors, and sash, and then polish, taking care not to scratch glass.
- E. Vacuum carpeting (shampoo where required), removing debris and excess nap.
- F. Repair, patch and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air filters where units were operated during construction.
- H. Maintain cleaning until project, or portion thereof, is occupied by Owner.

**END OF SECTION**

## SECTION 01 77 00

### CONTRACT CLOSEOUT

#### PART 1 GENERAL

##### 1.01 DESCRIPTION

- A. The requirements specified in this section relate to all Contractors individually performing under these Contract Documents:
  - 1. Project Record Documents.
  - 2. Final review and payment.
- B. Related work specified elsewhere:
  - 1. OSU General Conditions.
  - 2. Shop Drawings, Product Data and Samples, Section 01 33 23.

##### 1.02 PROJECT RECORD DOCUMENTS

- A. The Project Record Documents shall be organized to include the following information:
  - 1. Table of Contents
  - 2. Project Team List
  - 3. Specifications (Including Addenda and Change Orders)
  - 4. Drawings
  - 5. Inspection Reports, as applicable
  - 6. Signed Warranty(ies)
  - 7. Maintenance Instructions
- B. Draft Project Record Documents shall be submitted for review upon 75% completion of the Work.
- C. Project Record Documents shall be submitted electronically to the Owner. Hard copies will not be accepted.
- D. The project team list shall include the name, address, and phone number of the Owner, Contractor, Inspector, Subcontractors, and the materials manufacturers.
- E. Legibly mark each Specification section to indicate actual as-built condition indicating changes in the Work made by addenda or change order or actual materials used and actual manufacturer(s) used.
- F. Maintain current and accurate as-built mark-ups during construction and make available to Owner's Authorized Representative upon request.
- G. Legibly mark the drawings to indicate actual as-built conditions indicating changes in the Work made by addenda or change order or actual conditions which differ from the drawings.
- H. Redraw or provide new drawings as required for a complete as-built set of drawings. The Contractor shall maintain current and accurate as-built mark-ups during

construction and make available to Owner's Authorized Representative.

- I. Include inspection reports if applicable.
- J. Include, in a single section, all copies of the Project's labor and material warranties clearly marked to identify the Owner's responsibilities under the terms of each warranty and the section of Work that each warranty covers. One set must be clearly marked as containing original documents.
- K. In the case of an elevator installation, the Contractor's and manufacturer's warranty shall provide for the Owner's right to respond to emergency/car failure situations for the purpose of extricating individuals trapped in the elevator.
- L. Include maintenance instructions complete with technical information and name, address, and phone number of the Contractor(s) and manufacturer(s) of each material and product.

### **1.03 FINAL REVIEW AND PAYMENT**

- A. Prior to completion, the Contractor shall inspect the Work and make a Punch-list noting all items that are incomplete and/or incorrect.
- B. The Contractor shall notify all Subcontractors in writing of incomplete and/or incorrect items. Notify far enough in advance of the completion date that the Work can be completed on schedule. Said Work shall be immediately corrected.
- C. Should conditions prevail which prohibit some elements of the Work from being accomplished, but the work-in-place will perform the primary function (i.e., painting cannot be completed due to high moisture content of masonry walls.) the Contractor shall record the reason with this Punch-list item requesting temporary delay in completion from the Owner in writing.
- D. Notify the Owner in writing that all items are completed and ready for final review or else that the Work product is fully usable, but some listed deficiencies remain to be completed. Submit all record documents at this time.
- E. The Owner will review all documents. When the documents include a Contractor's request for delay in completion, the Owner will review all Work which is certified as complete to the best knowledge of the Contractor. The Owner will also review the listed incomplete Work and assign a value to such uncompleted work.
- F. The Contractor shall make the required corrections to the Work expeditiously. A letter will be addressed to the Contractor informing the Contractor of the project status.
- G. When Contract closeout procedures are completed and all Punch-list deficiencies have been corrected, provide Owner with final corrected Project Record Documents based on Owner's preliminary review. Correct Project Record Documents shall be in electronic format.
- H. Final Completion by the Owner will be documented and the Contractor will receive



written notice of acceptance of the Work and notification that final payment may be billed and released.

- I. All warranties shall commence and become effective beginning on the date of Substantial Completion.

**END OF SECTION**

SECTION 09 9123  
PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior Paint
- B. Exterior Paint
- C. Wall Preparation

1.2 REFERENCES

- A. ASTM D 16 - Standard Terminology for Paint, Coatings, Materials, and Applications; 1998b.
- B. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
- C. ASTM D 522 - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings.
- D. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 1992 (Reapproved 1997).
- E. MPI (APL) - Master Painters Institute.
- F. SSPC (PM1) - Steel Structures Painting Manual, Vol. 1, Good Painting Practice; Society for Protective Coatings; 1993, Third Edition.
- G. SSPC (PM2) - Steel Structures Painting Manual, Vol. 2, Systems and Specifications; Society for Protective Coatings; 1995, Seventh Edition.
- H. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

1.3 DEFINITIONS

- A. Gloss: As measured by a gloss meter from a 60 degree angle from vertical, as a percentage of the amount of light that is reflected. The following terms are used:
  - 1. Flat: Less than 5 Percent; Less than 5 percent at 85 degrees.
  - 2. Velvet: Less than 5 Percent; 4 to 20 percent at 85 degrees.
  - 3. Eggshell: 5 to 10 Percent; 4 to 20 percent at 85 degrees.
  - 4. Satin: 10 to 20 Percent.
  - 5. Semi-Gloss: 45 to 55 Percent.
  - 6. Gloss: 75 to 90 Percent.

#### 1.4 SUBMITTALS

- A. See Section 01 33 23; Shop Drawings, Product Data, Samples.
- B. Product Data:
  - 1. Provide complete list of all products to be used, with the following information for each:
    - a. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
    - b. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
- C. Samples:
  - 1. Submit three paper "drop" samples, 5-inches by 7-inches in size, illustrating selected colors for each color and system selected with specified coats cascaded.
  - 2. Where sheen is specified, submit samples in only that sheen.
  - 3. Opaque Finishes: Furnish samples of each color and material in quantities described above, with texture to simulate actual conditions. Resubmit each sample as requested until required sheen, color and texture are achieved.
  - 4. Transparent Finishes: On specified wood surfaces, provide two 12-inch by 12-inch samples of each natural / stained finish as required.
- D. Manufacturer's Certification: Provide signed letter from the paint manufacturer certifying that products provided meet or exceed the specified requirements of this section.
- E. Manufacturer's Instructions: Indicate special surface preparation procedures.
- F. Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years' experience in commercial construction.
- B. Installer Qualifications: All products listed in this section are to be installed by a single installer with a minimum of five years demonstrated experience in installing products of the same type and scope as specified in commercial construction.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local Authorities Having Jurisdiction.
- C. Disposal:
  - 1. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store safely for future use.
  - 2. Do not incinerate closed containers.

3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

#### 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.8 WARRANTY

- A. At project closeout, provide to Owner or owner's representative an executed copy of the Manufacturer's standard form outlining the terms and conditions of and any exclusions to their Limited Warranty against Manufacturing Defect. Warranty to be effective for a minimum of one year from Substantial Completion.

#### 1.9 EXTRA MATERIALS

- A. At project closeout, supply Owner or owner's representative one gallon of each product for touch-up purposes.
- B. At project closeout, provide the color mixture name and code to Owner or owner's representative for accurate future color matching.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturer:
  1. Basis for Design: Miller Paint Co.
  2. Benjamin Moore
  3. PPG Pittsburgh
  4. Rust-Oleum
  5. Sherwin-Williams
- B. Substitutions: See Section 01 25 00 – Product Substitution Procedures.

#### 2.2 MATERIALS - GENERAL

- A. Volatile Organic Compound (VOC) Content:
  1. Provide coatings that comply with the most stringent requirements specified in the following: 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to Authorities Having Jurisdiction.

B. Paints and Coatings:

1. Provide ready mixed paints and coatings, except field-catalyzed coatings.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 INTERIOR SURFACES

A. Plaster and Gypsum Wallboard:

1. Primer:
  - a. Kril Primer Sealer - 6040.
  - b. Finish: Low sheen.
2. Finish Coat:
  - a. Evolution 100% Acrylic Ceramic – 1580; Water Based.
  - b. Finish: Matte.

B. Woodwork and Trim, Enamel Finishes:

1. Primer: Acrylic Enamel Undercoat - 2840; Water Based.
2. Finish Coat:
  - a. Acrinamel Gloss Paint - 7300; Water Based.
  - b. Finish: Gloss.

C. Woodwork and Trim, Clear and Stained Finishes:

1. Stain:
  - a. Acriclear Stain - 1228; Water Based.
  - b. Finish: Semi Transparent.
2. Primer / Sealer:
  - a. Acriclear Sanding Sealer - 1220; Water Based.
  - b. Finish: Satin.
3. Finish Coat:
  - a. Acriclear Varnish - 1221; Water Based.
  - b. Finish: Gloss.

D. Metal - Ferrous; Enamel Finishes:

1. Primer: Premium Metal Primer - 363, spray applied:
  - a. Color: Red Oxide.
  - b. Finish: Flat.

2. Finish Coat:
    - a. Acrinamel Gloss Paint - 7300; Water Based.
    - b. Finish: Gloss.
  3. Finish Coat:
    - a. Premium Alkyd Enamel - 6750; Solvent Based.
    - b. Finish: Semi-Gloss.
  - E. Metal - Non-Ferrous and Galvanized; Enamel Finishes:
    1. Primer/Finish (Direct to Metal):
      - a. Acrimetal DTM - 5077; Water Based.
      - b. Finish: Velvet - Black.
- 2.4 EXTERIOR SURFACES
- A. Exterior gyp sheathing / plaster (stucco):
    1. Primer:
      - a. Kril Primer Sealer - 6040; Water Based.
      - b. Finish: Low sheen.
    2. Finish Coat:
      - a. Evolution Flat Exterior Paint - 8500; Water Based.
      - b. Finish: Flat.
  - B. Metal - Ferrous; Enamel Finishes:
    1. Primer: Premium Metal Primer - 363, spray applied:
      - a. Color: Red Oxide.
      - b. Finish: Flat.
    2. Finish:
      - a. Speed Enamel - 3610.
      - b. Finish: Semi-Gloss.
  - C. Metal - Non-Ferrous and Galvanized; Enamel Finishes:
    1. Primer / Finish (Direct to Metal):
      - a. Acrimetal DTM - 5077 - Water Based.
      - b. Finish: Velvet - Black.

## PART 3 EXECUTION

### 3.1 SCOPE SURFACES TO BE FINISHED

- A. Paint all exposed surfaces except where indicated not to be painted or to remain natural; the term "exposed" includes areas visible through permanent and built-in fixtures when they are in place.

- B. Paint the surfaces described in PART 2, indicated on the Drawings, and as follows:
1. If a surface, material, or item is not specifically mentioned, paint in the same manner as similar surfaces, materials, or items, regardless of whether colors are indicated or not.
  2. Paint surfaces behind movable equipment and furnishings the same as similar exposed surfaces.
  3. Paint surfaces to be concealed behind permanently installed fixtures, equipment, and furnishings, using primer only, prior to installation of the permanent item.
  4. Paint back sides of access panels and removable and hinged covers to match exposed surfaces.
  5. Finish top, bottom, and side edges of exterior doors the same as exposed faces.
  6. Paint all insulated and exposed pipes, conduit, boxes, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment occurring in finished areas to match background surfaces, unless otherwise indicated.
  7. Paint all mechanical and electrical equipment, including that which is factory-finished, exposed to weather or to view on the outdoors.
  8. Paint shop-primed mechanical and electrical items occurring in finished areas.
- C. Do Not Paint or Finish the Following Items:
1. Items fully factory-finished unless specifically noted; factory-primed items are not considered factory-finished.
  2. Items indicated to receive other finish.
  3. Items indicated to remain naturally finished.
  4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
  5. Anodized aluminum.
  6. Polished and brushed stainless steel items.
  7. Brick, precast concrete, integrally colored plaster.
  8. Polished and brushed stainless steel, anodized aluminum, bronze, terne, and lead.
  9. Concealed piping, ductwork, and conduit.

### 3.2 EXAMINATION

- A. Verify surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials; report incompatible primer conditions and submit recommended changes for Architect's approval.

- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces is below the following maximums:
  - 1. Plaster and Gypsum Board: 12 percent.
  - 2. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
- E. Any surface with stencil, signs or labels requires replacement of graphics in-kind. Denote requirements and obtain direction from Owner's Representative for direction.

### 3.3 PREPARATION

- A. Prepare surfaces as specified in MPI Architectural Painting Specification Manual and as follows for the applicable surface and coating; if multiple preparation treatments are specified, use as many as necessary for best results; where the Manual references external standards for preparation (e.g. SSPC standards), prepare as specified in those standards; comply with coating manufacturer's specific preparation methods or treatments, if any.
- B. Coordinate painting work with cleaning and preparation work so that dust and other contaminants do not fall on newly painted, wet surfaces.
- C. Surface Appurtenances: Prior to preparing surfaces or finishing, remove electrical plates, hardware, light fixtures, light fixture trim, escutcheons, machined surfaces, fittings, and similar items already installed that are not to be painted.
  - 1. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and finishing.
  - 2. After completing painting in each space or area, reinstall items removed using workers skilled in the trades involved.
- D. Surfaces: Correct defects and clean surfaces which affect work of this section. Remove or repair existing coatings that exhibit surface defects.
- E. Marks: Seal with shellac those which may bleed through surface finishes.
- F. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.4 APPLICATION

- A. Apply products in accordance with manufacturer's instructions and as specified or recommended by MPI Manual, using the preparation, products, sheens, textures, and colors as indicated. Remove, refinish, or repaint work not complying with requirements.
- B. Do not apply finishes over dirt, rust, scale, grease, moisture, scuffed surfaces, or other conditions detrimental to formation of a durable coating film; do not apply finishes to surfaces that are not dry.
- C. Use applicators and methods best suited for substrate and type of material being applied and according to manufacturer's instructions.
  - 1. Brush Application: Use brushes best suited for the type of material applied; use brush of appropriate size for the surface or item being painted; produce results free of visible brush marks.



2. Roller Application: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
  3. Spray Application: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
  4. Where application method is listed in the MPI Manual for the paint system that application method is required; otherwise any application method recommended by manufacturer for material used and objects to be painted is acceptable.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate; provide total dry film thickness of entire system as recommended by manufacturer.
1. Number of coats and film thickness required are the same regardless of application method.
  2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
  3. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
- E. Apply finish to completely cover surfaces with uniform appearance without brush marks, runs, sags, laps, ropiness, holidays, spotting, cloudiness, or other surface imperfections.
1. Before applying finish coats, apply a prime coat of material recommended by manufacturer, unless the surface has been prime coated by others; where evidence of suction spots or unsealed areas in first coat appear, recoat primed and sealed surfaces to ensure finish coat with no burn through or other defects due to insufficient sealing.
  2. Apply first coat to surface that has been cleaned, pretreated, or otherwise prepared as soon as practical after preparation and before subsequent surface deterioration.
  3. Do not apply succeeding coats until the previous coat has cured as recommended by manufacturer.
  4. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat will not cause the undercoat to lift or lose adhesion.
  5. If manufacturer's instructions recommend sanding to produce a smooth, even surface, sand between coats.
  6. Before applying next coat vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

### 3.5 CLEANING AND PROTECTION

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from site.
- C. Protect other work, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting as approved by Owner's Representative.

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- D. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in MPI Manual.

END OF SECTION

SECTION 26 0000

ELECTRICAL BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Work included in 26 0000, Electrical Basic Requirements applies to Division 26, Electrical work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of electrical systems for proposed project.
- B. Contract Documents include, but are not limited to, Specifications including Division 01, General Requirements, Drawings, Addenda and Owner/Contractor Agreement. Confirm requirements before commencement of work.
- C. Definitions:
  - 1. Provide: To furnish and install, complete and ready for intended use.
  - 2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
  - 3. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
  - 4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent", substitution requests must be submitted to Engineer for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer and Owner prior to submitting bids for substituted items.
  - 5. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, Owner's representative, and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

- A. Contents of Section apply to Division 26, Electrical Contract Documents.
- B. Related Work:
  - 1. Additional conditions apply to this Division including, but not limited to:
    - a. Specifications including Division 01, General Requirements.
    - b. Drawings
    - c. Addenda
    - d. Owner/Contractor Agreement
    - e. Codes, Standards, Public Ordinances and Permits

### 1.3 REFERENCES AND STANDARDS

- A. References and Standards per Division 01, General Requirements, individual Division 26, Electrical Sections and those listed in this Section.
- B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents, of/from:
  - 1. State of Oregon:
    - a. OAR - Oregon Administrative Rules
    - b. OESC - Oregon Electrical Specialty Code
    - c. OFC - Oregon Fire Code
    - d. OMSC - Oregon Mechanical Specialty Code
    - e. OSSC - Oregon Structural Specialty Code
    - f. Oregon Elevator Specialty Code
- C. Reference standards and guidelines include but are not limited to the latest adopted editions from:
  - 1. ADA - Americans with Disabilities Act
  - 2. ANSI - American National Standards Institute
  - 3. ETL - Electrical Testing Laboratories
  - 4. FM - FM Global
  - 5. IBC - International Building Code
  - 6. ICC - International Code Council
  - 7. IEC - International Electrotechnical Commission
  - 8. IEEE - Institute of Electrical and Electronics Engineers
  - 9. IES - Illuminating Engineering Society
  - 10. MSS - Manufacturers Standardization Society
  - 11. NEC - National Electric Code
  - 12. NECA - National Electrical Contractors Association
  - 13. NEMA - National Electrical Manufacturers Association
  - 14. NETA - National Electrical Testing Association
  - 15. NFPA - National Fire Protection Association
  - 16. OSHA - Occupational Safety and Health Administration
  - 17. UBC - Uniform Building Code
  - 18. UL - Underwriters Laboratories Inc.

- D. See Division 26, Electrical individual Sections for additional references.
- E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.
- F. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

#### 1.4 SUBMITTALS

- A. See Division 01, General Requirements for Submittal Procedures as well as individual Division 26, Electrical Sections.
- B. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
- C. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. All transmissions/submissions to be submitted to Owner.
- D. Product Data: Provide manufacturer's descriptive literature for products specified in Division 26, Electrical Sections.
- E. Identify/mark each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and drawings.
  - 1. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
  - 2. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference individual Division 26, Electrical specification Sections for specific items required in product data submittal outside of these requirements.
  - 3. See Division 26, Electrical individual Sections for additional submittal requirements outside of these requirements.
- F. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items. Incomplete submittal packages/submittals will be returned to contractor without review.

- G. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 26, Electrical Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical submittals.
- H. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
- I. Substitutions and Variation from Basis of Design:
  - 1. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
  - 2. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, then provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to Engineer for approval prior to purchase, delivery or installation.
- J. Shop Drawings:
  - 1. Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams.
  - 2. Reference individual Division 26, Electrical specification Sections and Section 01 33 23, Shop Drawings, Product Data, Samples for additional requirements for shop drawings outside of these requirements.
- K. Samples:
  - 1. Provide samples when requested by individual Sections.
  - 2. Reference individual Division 26, Electrical specification Sections and Section 01 33 23, Shop Drawings, Product Data, Samples for additional requirements.
- L. Resubmission Requirements:
  - 1. Make any corrections or change in submittals when required. Provide submittals as specified. The engineer will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
  - 2. Resubmit for review until review indicates no exceptions taken or "make corrections as noted".
- M. Operation and Maintenance Manuals, Owners Instructions:
  - 1. Refer to Section 01 7700, Contract Closeout, for submittal information.

2. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 26 0000, Electrical Basic Requirements, Demonstration.
3. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

N. As-Built Drawings:

1. Maintain at site at least one set of drawings for recording "As-constructed" conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements, location of conduit, and location of concealed electrical items. Include items changed by field orders, supplemental instructions, and constructed conditions.
2. As-Built Drawings are to include equipment and fixture/connection schedules that accurately reflect "as constructed or installed" for project.
3. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD disk and drawings upon substantial completion.
4. See Division 26, Electrical individual Sections for additional items to include in As-Built Drawings.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Work and materials installed to conform to all local, State and Federal codes, and other applicable laws and regulations.
- B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (i.e. distribution equipment, duct banks, light fixtures, etc.) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.
- C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer and Owner in writing before starting work.
- D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.
- E. UL Compliance: Provide products which are UL listed.
- F. Reference individual Division 26, Electrical Sections and Section 01 45 00, Quality Control for additional requirements for quality assurance outside of these requirements.

1.6 WARRANTY

- A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.

- B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

#### 1.7 COORDINATION DOCUMENTS

- A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, lights, cable tray and electrical services with architectural and structural requirements, and other trades (including ceiling suspension and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.
- B. Advise Owner in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Owner of conflict.
- C. Verify in field exact size, location, and clearances regarding existing material, equipment and apparatus, and advise Owner of discrepancies between that indicated on Drawings and that existing in field prior to installation.
- D. Submit final Coordination Drawings with changes as As-Built Drawings at completion of project.

#### 1.8 LETTER OF CONFORMANCE

- A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement that Electrical items were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Provide like items from one manufacturer.

#### 2.2 MATERIALS

- A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL or ETL approved or have adequate approval or be acceptable by state, county, and city authorities. Equipment/fixture supplier is responsible for obtaining State, County, and City acceptance on equipment/fixtures that are not UL approved or are not listed for installation.
- B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.
- C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.
- D. Hazardous Materials:
  - 1. Comply with local, State of Oregon, and Federal regulations relating to hazardous materials.



2. Comply with Division 01, General Requirements for this project relating to hazardous materials.
  3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner. Hazardous materials will be removed by Owner under separate contract.
- E. Reference individual Division 26, Electrical specification Sections and Section 01 60 00, Product Requirements for additional requirements for materials outside of these requirements.

### PART 3 - EXECUTION

#### 3.1 ACCESSIBILITY AND INSTALLATION

- A. Confirm Accessibility and Installation requirements in Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B. Install equipment requiring access (i.e., junction boxes, light fixtures, power supplies, motors, etc.) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in passageways, doorways, scuttles or crawlspaces which would impede or block the intended usage.
- C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Engineer and Owner prior to proceeding with installation. This includes proper installation methods, sequencing, and coordination with other trades and disciplines.
- D. Firestopping: Comply with individual Division 26, Electrical Sections and coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around piping and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- E. In plenums, provide plenum rated materials that meet the requirements to be installed in plenums. Immediately notify Engineer and Owner of discrepancy.
- F. Start up equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- G. Provide miscellaneous supports/metals required for installation of equipment and conduit.

#### 3.2 REVIEW AND OBSERVATION

- A. Confirm Review and Observation requirements in Division 00, Procurement and Contracting Requirements, Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B. Notify Engineer and Owner in writing at following stages of construction so that they may, at their option, visit site for review and construction observation:
  1. Underground conduit installation prior to backfilling.

2. Prior to covering walls.
  3. Prior to ceiling cover/installation.
  4. When main systems, or portions of, are being tested and ready for inspection by AHJ.
- C. Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

### 3.3 CONTINUITY OF SERVICE

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements in Division 01, General Requirements, comply with individual Division 26, Electrical Sections and the following:
1. During remodeling or addition to existing structure, while existing structure is occupied, present services to remain intact until new construction, facilities or equipment is installed.
  2. Prior to changing over to new service, verify that every item is thoroughly prepared. Install new wiring, and wiring to point of connection.
  3. Coordinate transfer time to new service with Owner. If required, perform transfer during off-peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.
  4. No interruption of services to any part of existing facilities will be permitted without express permission in each instance from Owner. Requests for outages must state specific dates, hours and maximum durations, with outages kept to these specific dates, hours and maximum durations. Obtain written permission from Owner for any interruption of power, lighting or signal circuits and systems.
    - a. Organize work to minimize duration of power interruption.
    - b. Coordinate utility service outages with utility company.

### 3.4 CUTTING AND PATCHING

- A. Reference section 01 73 29, Cutting and Patching, for cutting and patching requirements.

### 3.5 EQUIPMENT SELECTION AND SERVICEABILITY

- A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

### 3.6 DELIVERY, STORAGE AND HANDLING

- A. Confirm requirements in Division 01, General Requirements. In the absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust. Products and/or materials that become damaged due to water, dirt, and/or dust as a result of improper storage and handling to be replaced before installation.
  2. Protect equipment to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3. Protect bus duct and similar items until in service.

### 3.7 DEMONSTRATION

- A. Confirm Demonstration requirements in Division 01, General Requirements and individual Division 26, Electrical Sections.
- B. Upon completion of work and adjustment of equipment, test systems and demonstrate to Owner, Owner's Representative and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Maintenance Staff as specified in Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- C. Manufacturer's Field Services: Furnish services of a qualified person at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

### 3.8 CLEANING

- A. Reference Section 01 74 00, Cleaning for cleaning requirements.

### 3.9 INSTALLATION

- A. Confirm Installation requirements in Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B. Install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level and firmly anchored to vibration isolators. Maintain manufacturer's recommended clearances.
- C. Startup equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- D. Provide miscellaneous supports/metals required for installation of equipment.

### 3.10 PAINTING

- A. Reference Section 09 91 23, Painting and Coating, for painting requirements.

### 3.11 ACCEPTANCE

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 26, Electrical Sections and the following:
  1. System cannot be considered for acceptance until work is completed and demonstrated to Owner that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
    - a. Cleaning
    - b. Operation and Maintenance Manuals
    - c. Training of Operating Personnel
    - d. As-Built Drawings

- e. Warranty and Guaranty Certificates
- f. Start-up/Test Document and Commissioning Reports

### 3.12 FIELD QUALITY CONTROL

- A. Confirm Field Quality Control requirements in Division 01, General Requirements, Section 26 0000, Electrical Basic Requirements and individual Division 26, Electrical Sections.
- B. Tests:
  - 1. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
  - 2. During site evaluations by Owner or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

END OF SECTION

SECTION 26 0519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included: Provision of materials, installation and testing of wires and cables.

1.2 RELATED SECTIONS

- A. Division 28, Electronic Safety
- B. Division 26, Electrical
- C. Division 01, General Requirements

1.3 REFERENCES AND STANDARDS

- A. References and standards as required by Division 26, Electrical and Division 01, General Requirements.

1.4 SUBMITTALS

- A. Submittals as required by Division 26, Electrical and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Division 26, Electrical and Division 01, General Requirements.

1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Division 26, Electrical and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wires and Cables:
  - 1. Carol
  - 2. General Cable
  - 3. Okonite
  - 4. Southwire
  - 5. West Penn
  - 6. Belden
  - 7. Or approved equivalent.

## 2.2 WIRES AND CABLES

- A. FPL, FPLR, or FPLP rated per OESC.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

#### A. Wires and Cables:

1. Conductor Installation:
  - a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
  - b. Install conductors with care to avoid damage to insulation.
  - c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
  - d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.
  - e. Do not use aluminum wire to make connections to mechanical equipment.
2. Conductor Size and Quantity:
  - a. Install no conductors smaller than 18AWG unless otherwise shown.
  - b. Provide required conductors for a fully operable system.
3. Conductors in Cabinets:
  - a. Cable and tree wires in panels and cabinets for power and control. Use plastic ties in panels and cabinets.
  - b. Hold conductors away from sharp metal edges.
4. Exposed cable is not allowed.

END OF SECTION

SECTION 26 0529

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included:

1. Hangers
2. Supports
3. Anchors
4. Threaded Rod
5. Fasteners

B. Safety factor of 4 required for every fastening device or support for electrical equipment installed. Supports to withstand four times the weight of equipment it supports.

1.2 RELATED SECTIONS

- A. Division 28, Electronic Safety
- B. Division 26, Electrical
- C. Division 01, General Requirements

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Division 26, Electrical and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Division 26, Electrical and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Division 26, Electrical and Division 01, General Requirements.
- B. Manufacturers regularly engaged in the manufacture of bolted metal framing support systems, whose products have been in satisfactory use in similar service for not less than 10 years.
- C. Support systems to be supplied by a single manufacturer.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Division 26, Electrical and Division 01 General Requirements.

## 1.7 PERFORMANCE REQUIREMENTS

- A. Provide conduit and equipment hangers and supports in accordance with the following:
  - 1. When supports, anchorages, and seismic restraints for equipment and supports, anchorages and seismic restraints for conduit, cable tray and equipment are not shown on the Drawings, the Contractor is responsible for their design.
  - 2. Connections to structural framing shall not introduce twisting, torsion, or lateral bending in the framing members. Provide supplementary steel as required.
- B. Provide channel support systems, for conduits to support multiple conduits capable of supporting combined weight of support systems and system contents.
- C. Provide seismic restraint hangers and supports for conduit and equipment.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Support Channel:
  - 1. B-Line
  - 2. Kindorf
  - 3. Superstrut
  - 4. Unistrut
- B. Anchors:
  - 1. Anchor It
  - 2. Epcon System
  - 3. Hilti-Hit System
  - 4. Power Fast System

### 2.2 MATERIALS

- A. Hangers, Supports, Anchors, Threaded Rod and Fasteners: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Concrete Inserts: Cast in concrete for support fasteners for loads up to 800 lbs.
- C. Anchors and Fasteners:
  - 1. Obtain permission from Owner before using powder-actuated anchors.
  - 2. Concrete Structural Elements: Use expansion anchors.
  - 3. Concrete Surfaces: Use self-drilling anchors.
  - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts.
  - 5. Solid Masonry Walls: Use expansion anchors.



6. Sheet Metal: Use sheet metal screws.
7. Wood Elements: Use wood screws.

## 2.3 MISCELLANEOUS METAL

### A. General:

1. Provide miscellaneous metal items specified hereunder, including materials, fabrication, fastenings and accessories required for finished installation, where indicated on Drawings or otherwise not shown on drawings that are necessary for completion of the project. Contractor is responsible for their design.
2. Fabricate miscellaneous units to size shapes and profiles indicated or, if not indicated, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.

B. Structural Shapes: Where miscellaneous metal items are needed to be fabricated from structural steel shapes and plates, provide members constructed of steel conforming to requirements of ASTM A36 or approved equivalent.

C. Steel Pipe: Provide seamless steel pipe conforming to requirements of ASTM A53, Type S, Grade A, or Grade B. Weight and size required as specified.

D. Fasteners: Provide fasteners of types as required for assembly and installation of fabricated items; surface-applied fasteners are specified elsewhere.

### E. Bolts:

1. Low carbon steel externally and internally threaded fasteners conforming to requirements of ASTM A307; include necessary nuts and plain hardened washers.
2. For structural steel elements supporting mechanical material or equipment from building structural members or connection to building structural members, use fasteners conforming to ASTM A325.

### F. Miscellaneous Materials:

1. Provide incidental accessory materials, tools, methods, and equipment required for fabrication.
2. Provide hot dipped galvanized components for items exposed to weather.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install vertical support members for equipment, straight and parallel to building walls.
- C. Install horizontal support members straight and parallel to ceilings or finished floor unless otherwise noted.

- D. Provide independent supports to structural member for electrical materials, or equipment installed in or on ceiling, walls or in void spaces or over suspended ceilings.
- E. Do not use other trade's fastening devices as supporting means for electrical equipment or materials.
- F. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
- G. Do not use supports or fastening devices to support other than one particular item.
- H. Support conduits within 18-inches of outlets, boxes, panels, cabinets and deflections unless more stringently required by OESC.
- I. Maximum distance between supports not to exceed 8-foot spacing unless otherwise required by OESC.
- J. Support flexible conduits and metal clad cable within 12-inches of outlets, boxes, panels, cabinets and deflections unless otherwise required by OESC.
- K. Maximum distance between supports for flexible conduits and metal clad cable not to exceed 48-inches spacing unless otherwise required by OESC.
- L. Maximum distance between supports for auxiliary gutters and wireways unless otherwise required by OESC is as follows:
  - 1. Sheet Metal Auxiliary Gutters and Wireways: 4-feet apart horizontally and 10-feet vertically.
  - 2. Non-Metallic Auxiliary Gutters and Wireways: 30-inches apart horizontally and 3-feet vertically.
- M. Install strut hangers as instructed by strut manufacturer. Suspended strut hangers as instructed by strut manufacturer for the load, with a maximum spacing of 8-feet on center and within 2-feet of outlet box, cabinet, junction box or other channel raceway termination unless otherwise required by OESC.
- N. Coordinate routing of conduit racks with materials and equipment installed by other trades. Where conduit racks are exposed to view, coordinate location and installation with Owner for optimal appearance.
- O. Securely suspend junction boxes, pull boxes or other conduit terminating housings located above suspended ceiling from floor above or roof structure to prevent sagging and swaying.
- P. Provide seismic bracing per OSSC requirements.
- Q. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- R. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- S. Use spring lock washers under fastener nuts for strut.

### 3.2 CUTTING AND DRILLING

- A. Do not drill or cut structural members without prior permission from Owner.

### 3.3 WET AND DAMP LOCATIONS

- A. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1-inch off wall.

### 3.4 FABRICATION - MISCELLANEOUS METALS

- A. Verify dimensions prior to fabrication. Form metal items to accurate sizes and configurations as indicated on Drawings and otherwise required for proper installation; make with lines straight and angles sharp, clean and true; drill, countersink, tap, and otherwise prepare items for connections with work of other trades, as required. Fabricate to detail of structural shapes, plates and bars; weld joints where practicable; provide bolts and other connection devices required. Include anchorages; clip angles, sleeves, anchor plates, and similar devices. Hot dipped galvanize after fabrication items installed in exterior locations. Set accurately in position as required and anchor securely to building construction. Construct items with joints formed for strength and rigidity, accurately machining for proper fit; where exposed to weather, form to exclude water.
- B. Finishes:
  - 1. Ferrous Metal: After fabrication, but before erection, clean surfaces by mechanical or chemical methods to remove rust, scale, oil, corrosion, or other substances detrimental to bonding of subsequently applied protective coatings. For metal items exposed to weather or moisture, galvanize in manner to obtain G90 zinc coating in accordance with ASTM A123. Provide other non-galvanized ferrous metal with 1 coat of approved rust-resisting paint primer, in manner to obtain not less than 1.0 mil dry film thickness. Touch-up damaged areas in primer with same material, before installation. Apply zinc coatings and paint primers uniformly and smoothly; leave ready for finish painting as specified elsewhere.
  - 2. Metal in contact with Concrete, Masonry and Other Dissimilar Materials: Where metal items are to be erected in contact with dissimilar materials, provide contact surfaces with coating of an approved zinc-chromate primer in manner to obtain not less than 1.0 mil film thickness, in addition to other coatings specified in these specifications.
  - 3. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

END OF SECTION

SECTION 26 0533

RACEWAYS

PART 1 - GENERAL

1.1 SUMMARY

A. Work included:

1. Electrical Metallic Tubing (EMT)
2. Flexible Metal Conduit (FMC)
3. Conduit Fittings
4. Surface Raceway Systems

B. Provide a complete system of conduit and fittings, with associated couplings, connectors, and fittings, as shown on drawings and described in these specifications.

1.2 RELATED SECTIONS

- A. Division 28, Electronic Safety
- B. Division 26, Electrical
- C. Division 01, General Requirements

1.3 REFERENCES AND STANDARDS

A. References and Standards as required by Division 26, Electrical and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Division 26, Electrical and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Division 26, Electrical and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Division 26, Electrical and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Electrical Metallic Tubing (EMT):
1. Allied Tube & Conduit
  2. Beck Manufacturing Inc.

3. Picoma
  4. Wheatland Tube Company
  5. Or approved equivalent.
- B. Flexible Metal Conduit (FMC):
1. AFC Cable Systems Inc.
  2. Electri-Flex Company
  3. International Metal Hose
  4. Or approved equivalent.
- C. Surface Raceway Systems:
1. Single Channel Surface Raceway and Signal:
    - a. Wiremold
    - b. Panduit
    - c. Or approved equivalent.
- 2.2 ELECTRICAL METALLIC TUBING (EMT)
- A. Description: UL 797, ANSI C80.3; steel galvanized tubing.
  - B. Fittings: NEMA FB 1; steel, compression or set screw type.
- 2.3 FLEXIBLE METAL CONDUIT (FMC)
- A. Description: UL 1, Interlocked steel construction.
  - B. Fittings: NEMA FB 2.20.
- 2.4 CONDUIT FITTINGS
- A. Bushings:
    1. Insulated type for threaded rigid, IMC conduit or raceway connectors without factory installed plastic throat conductor protection: Thomas & Betts 1222 Series or O-Z Gedney B Series.
    2. Insulated grounding type for threaded rigid, IMC conduit and conduit connectors: O-Z Gedney BLG Series.
  - B. Raceway Connectors and EMT Couplings:
    1. Steel connectors, couplings, and conduit bodies, with zinc electroplate or hot-dip galvanized.
    2. Connector throats (EMT, flexible conduit, metal clad cable and cordset connectors) have factory installed plastic inserts permanently installed. For normal cable or conductor exiting angles from raceway, the cable jacket or conductor insulation bears only on plastic throat insert.

## 2.5 SURFACE RACEWAY SYSTEMS

- A. Single Channel Surface Raceway.
- B. Provide end caps, corner joints, tees, transition fittings, and the like, for complete installation.
- C. Finish: Ivory.
- D. Basis of Design: Surface raceway is based on Wiremold or Panduit product line. Approved manufacturers listed are allowed on condition of meeting the specified conditions including area of fill, finish and coordination with other trades. Remove and replace raceway not meeting these conditions at no cost to Owner.

## PART 3 - EXECUTION

### 3.1 SEQUENCING AND SCHEDULING

- A. Raceway system is defined as consisting of conduit, tubing, duct, and fittings including but not limited to connectors, couplings, offsets, elbows, bushings, expansion/deflection fittings, and other components and accessories. Complete electrical raceway installation before starting the installation of conductors and cables.
- B. Finished Surfaces: Schedule raceway installation to avoid conflict with installed wall and ceiling surfaces. If unavoidable, coordinate work and repairs with Owner.

### 3.2 CONDUIT REQUIREMENTS

- A. Conduit Size: Minimum 3/4-inch for power and control, unless otherwise noted. 3/4-inch for communication/data, unless otherwise noted. 3/4-inch for signal systems, unless otherwise noted. 1/2-inch allowed for single connection to signaling appliance or device.
- B. FMC, 3/4-inch minimum, may be used for short runs fished within existing hard walls and ceilings, where it is not practicable to install EMT. FMC may also be used for ceiling mounted appliances and devices in acoustical tile ceilings.

### 3.3 EXAMINATION

- A. Verify that field measurements are as shown on drawings.
- B. Plan locations of conduit runs in advance of the installation and coordinate with ductwork, plumbing, ceiling and wall construction in the same areas.
- C. Locate penetrations and holes in advance where they are proposed in the structural sections such as footings, beams, and walls. Penetrations are acceptable only when approved by the Engineer or Owner prior to construction, and after submittal of drawing showing location, size, and position of each penetration.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### 3.4 INSTALLATION

- A. Install conduit securely, in neat and workmanlike manner, as specified in NECA 1.
- B. Install steel conduit as specified in NECA 101.

- C. Conduit Supports:
  - 1. Arrange supports to prevent misalignment during wiring installation.
  - 2. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
  - 3. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
  - 4. Do not attach conduit to ceiling support wires.
- D. Flexible steel conduit length not-to-exceed 6-feet, 3-feet in concealed walls. Provide sufficient slack to reduce the effect of vibration.
- E. Install conduit seals at boundaries where ambient temperatures differ by 10 degrees F or more as shown on the drawings. Install seals on warm side of partition.
- F. Seal raceways penetrating an exterior building wall to prevent moisture and vermin from entering into the electrical equipment.
- G. Keep conduits a minimum of 12-inches away from steam or hot water radiant heating lines (at or above 104 degrees F) or 3-inches away from waste or water lines.
- H. Only conduit servicing elevator equipment can be installed through elevator shafts or equipment rooms. These conduits may only enter the room and go directly to the equipment being supplied.
- I. Keep 277/480 volt wiring independent of 120/208 volt wiring, and power wiring. Keep power wiring independent of communication system wiring. Keep emergency system wiring independent of other wiring systems.
- J. Keep life safety, critical branch and equipment systems wiring independent of other systems.
- K. Conduit Joints: Assemble conduits continuous and secure to boxes, panels, luminaires and equipment with fittings to maintain continuity. Rigid conduit connections to be threaded, clean and tight (metal to metal). Threadless connections are not permitted for RMC and IMC. Seal conduits where penetrating below raised floor area.
- L. Arrange conduit to maintain headroom and present neat appearance.
- M. Exposed conduits are permitted only in following areas:
  - 1. Mechanical rooms, electrical rooms or spaces where walls, ceilings and floors will not be covered with finished material.
  - 2. Route exposed conduit parallel and perpendicular to walls, tight to finished surfaces and neatly offset into boxes.
- N. Do not install conduits or other electrical equipment in obvious passages, doorways, scuttles or crawl spaces which would impede or block area passage's intended usage.
- O. Install continuous conduit and raceways for electrical power wiring and signal systems wiring.
- P. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- Q. Maintain adequate clearance between conduit and piping.

- R. Cut conduit square using saw or pipecutter; de-burr cut ends.
- S. Bring conduit to shoulder of fittings; fasten securely.
- T. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
- V. Conduit Terminations for Signal Systems: Provide a plastic bushing on the end of conduit used for signal system wiring.
- W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.

### 3.5 CONDUIT FITTINGS

- A. Use set screw type fittings only in dry locations.
- B. Use compression fittings in dry locations, damp and rain-exposed locations.
- C. Condulets and Conduit Bodies: Do not use condulets and conduit bodies.
- D. Sleeves and Chases for Floor, Ceiling and Wall Penetrations: Provide necessary rigid conduit sleeves, openings and chases where conduits or cables are required to pass through floors, ceilings or walls.

### 3.6 INTERFACE WITH OTHER PRODUCTS

- A. Install conduit to preserve fire resistance rating of partitions and other elements.

### 3.7 SURFACE METAL RACEWAY SYSTEM

- A. Install per manufacturer's installation instructions, perpendicular and parallel to building lines.
- B. Use flat-head screws, clips, and straps to fasten raceway channel to surfaces. Mount plumb and level.
- C. Use suitable insulating bushings and inserts at connections to outlets and corner fittings.
- D. Close end of wireway and unused conduit openings.

END OF SECTION



SECTION 26 0534

BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Work included:

1. Outlet Boxes
2. Pull and Junction Boxes

B. Outlet System: Provide electrical boxes and fittings for a complete installation. This includes, but is not limited to outlet boxes, junction boxes, pull boxes, bushings, locknuts and other necessary components.

C. Flush Outlets in Insulated Spaces: Maintain integrity of insulation and vapor barrier.

1.2 RELATED SECTIONS

- A. Division 28, Electronic Safety
- B. Division 26, Electrical
- C. Division 01, General Requirements

1.3 REFERENCES AND STANDARDS

A. References and Standards as required Division 26, Electrical and Division 01, General Requirements.

1.4 SUBMITTALS

A. Submittals as required by Division 26, Electrical and Division 01, General Requirements.

1.5 QUALITY ASSURANCE

A. Quality assurance as required by Division 26, Electrical and Division 01, General Requirements.

1.6 WARRANTY

A. Warranty of materials and workmanship as required by Division 26, Electrical and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Outlet Boxes:
1. Bowers
  2. Hubbell
  3. Raco

4. Steel City
  5. Thomas & Betts
  6. Or approved equivalent.
- B. Pull and Junction Boxes:
1. B-Line
  2. Hoffman
  3. Or approved equivalent.

## 2.2 OUTLET BOXES

- A. Device Outlet: Provide 4-inches square, minimum 1-1/2-inches deep. Single- or two-gang flush device raised covers.
- B. Construction: For interior locations, provide galvanized steel outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices.
- C. Accessories: Provide outlet box accessories for each installation, including mounting brackets, wallboard hangers, extension rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

## 2.3 PULL AND JUNCTION BOXES

- A. Location:
1. Provide junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.
  2. Provide junction boxes and pull boxes to facilitate installation of conductors and limiting accumulated angular sum of bends between boxes, cabinets and appliances to 270 degrees.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify locations of boxes and devices in offices and work areas prior to rough-in.

### 3.2 INSTALLATION

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1. Secure boxes rigidly to substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70. Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- C. Set wall mounted boxes at elevations to accommodate mounting heights required by codes and standards.

- D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- E. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6-inches from ceiling access panel or from removable recessed luminaire.
- F. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Division 07, Thermal and Moisture Protection.
- G. Align adjacent wall mounted outlet boxes for similar devices.
- H. Use flush mounting outlet box in finished areas.
- I. Do not install flush mounting box back-to-back in walls; provide minimum 6-inch separation. Provide minimum 24-inch separation in acoustic rated walls.
- J. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- K. Use adjustable steel channel fasteners for hung ceiling outlet box.
- L. Do not fasten boxes to ceiling support wires.
- M. Support boxes independently of conduit.
- N. Use cast outlet box in exterior locations exposed to the weather and wet locations.

### 3.3 ADJUSTING

- A. Adjust flush-mounting outlets to make front flush with finished wall material.
- B. Install knockout closures in unused box openings.

### 3.4 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.

END OF SECTION

SECTION 28 0001

ELECTRONIC SAFETY BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Work included in 28 00 01, Electronic Safety Basic Requirements applies to Division 28, Electronic Safety work to provide materials, labor, tools, permits, incidentals, and other services to provide and make ready for Owner's use of electronic safety systems for proposed project.
- B. Contract Documents include, but are not limited to, Specifications including Division 01, General Requirements, Drawings, Addenda and Owner/Contractor Agreement. Confirm requirements before commencement of work.
- C. Definitions:
  - 1. Provide: To furnish and install, complete and ready for intended use.
  - 2. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
  - 3. Install: Includes unloading, unpacking, assembling, erecting, installing, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
  - 4. Approved or Approved Equivalent: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the Contractor as "equivalent," substitution requests must be submitted to Engineer and Owner for consideration, in accordance with Division 01, General Requirements, and approved by the Engineer and Owner prior to submitting bids for substituted items.
  - 5. Authority Having Jurisdiction (AHJ): Indicates reviewing Authorities Having Jurisdiction, including local fire marshal, Owner's representative and other reviewing entity whose approval is required to obtain systems acceptance.

1.2 RELATED SECTIONS:

- A. Contents of Section apply to Division 28, Electronic Safety Contract Documents.
- B. Related Work:
  - 1. Additional conditions apply to this Division including, but not limited to:
    - a. Specifications including Division 01, General Requirements.
    - b. Drawings
    - c. Addenda
    - d. Owner/Contractor Agreement
    - e. Codes, Standards, Public Ordinances and Permits
- C. Contents of Division 26, Electrical apply to this Section.

### 1.3 REFERENCES AND STANDARDS

- A. References and Standards per Division 01, General Requirements, individual Division 28, Electronic Safety Sections and those listed in this Section.
- B. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Document, of/from:
  - 1. State of Oregon:
    - a. OAR - Oregon Administrative Rules
    - b. OESC - Oregon Electrical Specialty Code
    - c. OFC - Oregon Fire Code
    - d. OMSC - Oregon Mechanical Specialty Code
    - e. OSSC - Oregon Structural Specialty Code
    - f. Oregon Elevator Specialty Code
- C. Reference standards and guidelines include but are not limited to the latest adopted editions from:
  - 1. ADA - Americans with Disabilities Act
  - 2. ANSI - American National Standards Institute
  - 3. ETL - Electrical Testing Laboratories
  - 4. FM - FM Global
  - 5. ICC - International Code Council
  - 6. NEC - National Electric Code
  - 7. NEMA - National Electrical Manufacturers Association
  - 8. NFPA - National Fire Protection Association
  - 9. OSHA - Occupational Safety and Health Administration
  - 10. UL - Underwriters Laboratories Inc.
- D. See Division 28, Electronic Safety individual Sections for additional references.
- E. Where code requirements are at variance with Contract Documents, meet code requirements as a minimum requirement and include costs necessary to meet these in Contract.
- F. Machinery and equipment are to comply with OSHA requirements, as currently revised and interpreted for equipment manufacturer requirements. Install equipment provided per manufacturer recommendations.
- G. Whenever this Specification calls for material, workmanship, arrangement or construction of higher quality and/or capacity than that required by governing codes, higher quality and/or capacity take precedence.

#### 1.4 SUBMITTALS

- A. See Division 01, General Requirements for Submittal Procedures.
- B. "No Exception Taken" constitutes that review is for general conformance with the design concept expressed in the Contract Documents for the limited purpose of checking for conformance with information given. Any action is subject to the requirements of the Contract Documents. Contractor is responsible for the dimensions and quantity and will confirm and correlate at the job site, fabrication processes and techniques of construction, coordination of the work with that of all other trades, and the satisfactory performance of the work.
- C. Provide product submittals and shop drawings in electronic format only. Electronic format must be submitted via zip file via e-mail. For electronic format, provide one zip file per specification division containing a separate file for each specification Section. Individual submittals sent piecemeal in a per Specification Section method will be returned without review or comment. Copy Owner on all transmissions/submissions.
- D. Product Data: Provide manufacturer's descriptive literature for products specified in Division 28, Electronic Safety Sections.
- E. Identify/mark each submittal in detail. Note what difference, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and/or not discovered during the submittal review process, Contractor remains responsible for providing equipment and materials that meet the specifications and drawings.
  - 1. Label submittal to match numbering/references as shown in Contract Documents. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by/to other trades.
  - 2. Include technical data, installation instructions and dimensioned drawings for products, equipment and devices installed, furnished or provided. Reference individual Division 28, Electronic Safety specification Sections for specific items required in product data submittal outside of these requirements.
  - 3. See Division 28, Electronic Safety individual Sections for additional submittal requirements outside of these requirements.
- F. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items. Incomplete submittal packages/submittals will be returned to contractor without review.
- G. Trade Coordination: Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 28, Electronic Safety Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 26, Electrical and Division 28, Electronic Safety submittals.
- H. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.

- I. Substitutions and Variation from Basis of Design:
  - 1. The Basis of Design designated product establishes the qualities and characteristics for the evaluation of any comparable products by other listed acceptable manufacturers if included in this Specification or included in an approved Substitution Request as judged by the Design Professional.
  - 2. If substitutions and/or equivalent equipment/products are being proposed, it is the responsibility of parties concerned, involved in, and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor are required for the rough-in, circuitry or connections than for the item specified and provided for, provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements of "Submittals." For any product marked "or approved equivalent," a substitution request must be submitted to Engineer and Owner for approval prior to purchase, delivery or installation.
  - 3. Where manufacturer equipment or model numbers are indicated with no exceptions, substitutions will be rejected.
  - 4. Reference individual Division 28, Electronic Safety specification Sections and Section 01 25 00, Product Substitution Procedures for additional requirements
- J. Shop Drawings:
  - 1. Provide coordinated shop drawings which include physical characteristics of all systems, device layout plans, and control wiring diagrams.
  - 2. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.
  - 3. Reference individual Division 28, Electronic Safety specification Sections and Section 01 33 23, Shop Drawings, Product Data, Samples for additional requirements for shop drawings outside of these requirements.
- K. Samples:
  - 1. Provide samples when requested by individual Sections.
  - 2. Reference individual Division 28, Electronic Safety specification Sections and Section 01 33 23, Shop Drawings, Product Data, Samples for additional requirements.
- L. Resubmission Requirements:
  - 1. Make any corrections or change in submittals when required by Engineer or Owner review comments. Provide submittals as specified. The engineer and/or Owner will not be required to edit and/or interpret the Contractor's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
  - 2. Resubmit for review until review indicates no exceptions taken or "make corrections noted."
  - 3. When submitting drawings for Engineer's or Owner's re-review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

M. Operation and Maintenance Manuals, Owners Instructions:

1. Refer to Section 01 7700, Contract Closeout, for submittal information.
2. Thoroughly instruct Owner in proper operation of equipment and systems. Where noted in individual Sections, training will include classroom instruction with applicable training aids and systems demonstrations. Field instruction per Section 28 00 01, Electronic Safety Basic Requirements Article titled "Demonstration."
3. Copies of certificates of code authority inspections, acceptance, code required acceptance tests, letter of conformance and other special guarantees, certificates of warranties, specified elsewhere or indicated on Drawings.

N. As-Built Drawings:

1. Maintain at site at least one set of drawings for recording "as-constructed" conditions. Indicate on drawings changes to original documents by referencing revision document, and include buried elements and location of concealed items. Include items changed by addenda, field orders, supplemental instructions, and constructed conditions.
2. As-Built Drawings are to include equipment locations, calculations, and schedules that accurately reflect "as constructed or installed" for project.
3. At completion of project, input changes to original project on CAD Drawings and make one set of black-line drawings created from CAD Files in version/release equal to contract drawings. Submit CAD disk and drawings upon substantial completion.
4. See Division 28, Electronic Safety individual Sections for additional items to include in As-Built Drawings.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Work and materials to conform to all local, State, Federal and other applicable laws and regulations.
- B. Drawings are intended to be diagrammatic and reflect the Basis of Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout. Verify actual dimensions of systems (e.g. cable tray, panels, etc.) and equipment proposed to assure that systems and equipment will fit in available space. Contractor is responsible for design and construction costs incurred for equipment other than Basis of Design, including, but not limited to, architectural, structural, electrical, HVAC, fire sprinkler, and plumbing systems.
- C. Manufacturer's Instructions: Follow manufacturer's written instructions. If in conflict with Contract Documents, obtain clarification. Notify Engineer and Owner in writing before starting work.
- D. Items shown on Drawings are not necessarily included in Specifications or vice versa. Confirm requirements in all Contract Documents.
- E. UL Compliance: Provide products which are UL listed.
- F. Reference individual Division 28, Electronic Safety specification Sections and Section 01 45 00, Quality Control for additional requirements for quality assurance outside of these requirements.



## 1.6 WARRANTY

- A. Provide written warranty covering the work for a period of one year from date of Substantial Completion in accordance with Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- B. Sections under this Division can require additional and/or extended warranties that apply beyond basic warranty under Division 01, General Requirements and the General Conditions. Confirm requirements in all Contract Documents.

## 1.7 COORDINATION DOCUMENTS

- A. Prior to construction, coordinate installation and location of HVAC equipment, ductwork, grilles, diffusers, piping, plumbing equipment/fixtures, fire sprinklers, plumbing, cable trays, lights, and electrical services with architectural and structural requirements, and other trades (including ceiling suspension and tile systems), and provide maintenance access requirements. Coordinate with submitted architectural systems (i.e. roofing, ceiling, finishes) and structural systems as submitted, including footings and foundation. Identify zone of influence from footings and ensure systems are not routed within the zone of influence.
- B. Advise Owner in event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise Owner of conflict.
- C. Verify in field exact size, location, and clearances of existing material, equipment and apparatus, and advise Owner of discrepancies between that indicated on Drawings and that existing in field prior to installation.
- D. Submit final Coordination Drawings with changes as As-Built Drawings at completion of project.

## 1.8 LETTER OF CONFORMANCE

- A. Provide Letter of Conformance, copies of manufacturers' warranties and extended warranties with a statement in letter that electronic safety systems were installed in accordance with manufacturer's recommendations, UL listings and FM Global approvals. Include Letter of Conformance, copies of manufacturers' warranties and extended warranties in operating and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide like items from one manufacturer, including but not limited to panels, devices and equipment unless otherwise specified in individual Division 28, Electronic Safety Sections.

### 2.2 MATERIALS

- A. Base contract upon furnishing materials as specified. Materials, equipment, and fixtures used for construction are to be new, latest products as listed in manufacturer's printed catalog data and are to be UL, ETL, or FM approved or have adequate approval or be acceptable by state, county, and city authorities.
- B. Articles, fixtures, and equipment of a kind to be standard product of one manufacturer.
- C. Names and manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.

D. Hazardous Materials:

1. Comply with local, State of Oregon, and Federal regulations relating to hazardous materials.
2. Comply with Division 01, General Requirements for this project relating to hazardous materials.
3. Do not use any materials containing a hazardous substance. If hazardous materials are encountered, do not disturb; immediately notify Owner. Hazardous materials will be removed by Owner under separate contract.

- E. Reference individual Division 28, Electronic Safety specification Sections and Section 01 60 00, Product Requirements for additional requirements for materials outside of these requirements.

### PART 3 - EXECUTION

#### 3.1 ACCESSIBILITY AND INSTALLATION

- A. Confirm Accessibility and Installation requirements in Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- B. Install equipment having components requiring access (i.e., devices, equipment, electrical boxes, panels, etc.) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not install equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.
- C. Install equipment and products complete as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of equipment and examine instructions thoroughly. When requirements of installation instructions conflict with Contract Documents, request clarification from Engineer and Owner prior to proceeding with installation. This includes proper installation methods, sequencing and coordination with other trades and disciplines.
- D. Firestopping: Comply with individual Division 28, Electronic Safety Sections and coordinate location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, seal around conduit, raceway and equipment with approved firestopping material. Install firestopping material complete as directed by manufacturer's installation instructions. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- E. Plenums: In plenums, provide plenum rated materials that meet the requirements to be installed in plenums.

#### 3.2 REVIEW AND OBSERVATION

- A. Confirm Review and Observation requirements in Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- B. Notify Engineer and Owner in writing at following stages of construction so that they may, at their option, visit site for review and construction observation:
1. Underground conduit and wire installation prior to backfilling.

2. Prior to covering walls when electronic safety systems installation is started.
  3. Prior to ceiling cover/installation.
  4. When main systems, or portions of, are being tested and ready for inspection by AHJ.
- C. Final Punch: Costs incurred by additional trips required due to incomplete systems will be the responsibility of the Contractor.

### 3.3 CONTINUITY OF SERVICE

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements in Division 01, General Requirements, comply with individual Division 28, Electronic Safety Sections and the following:
1. During remodeling or addition to existing structures, while existing structure is occupied, current services to remain intact until new construction, facilities or equipment is installed.
  2. Prior to changing over to new system, verify that every item is thoroughly prepared. Install new wiring to point of connection.
  3. Coordinate transfer time to new service with Owner. If required, perform transfer during off peak hours. Once changeover is started, pursue to its completion to keep interference to a minimum. If overtime is necessary, there will be no allowance made by Owner for extra expense for such overtime or shift work.
  4. Organize work to minimize duration of power interruption.

### 3.4 CUTTING AND PATCHING

- A. Reference section 01 73 29, Cutting and Patching, for cutting and patching requirements.

### 3.5 EQUIPMENT SELECTION AND SERVICEABILITY

- A. Replace or reposition equipment which is too large or located incorrectly to permit servicing, at no additional cost to Owner.

### 3.6 DELIVERY, STORAGE AND HANDLING

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements, comply with the individual Division 28, Electronic Safety Sections and the following:
1. Handle materials delivered to project site with care to avoid damage. Store materials on site inside building or protected from weather, dirt and construction dust.
  2. Protect equipment and pipe to avoid damage. Close conduit openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.
  3. Protect devices, panels and similar items until in service.
  4. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation.

### 3.7 DEMONSTRATION

- A. Confirm Demonstration requirements in Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- B. Upon completion of work and adjustment of equipment, test systems, demonstrate to Owner, Owner's Representative and Engineer that equipment furnished and installed or connected under provisions of these Specifications functions in manner required. Provide field instruction to Owner's Staff as specified in Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- C. Manufacturer's Field Services: Furnish services of a qualified factory certified instructor at time approved by Owner, to instruct maintenance personnel, correct defects or deficiencies, and demonstrate to satisfaction of Owner that entire system is operating in satisfactory manner and complies with requirements of other trades that may be required to complete work. Complete instruction and demonstration prior to final job site observations.

### 3.8 CLEANING

- A. Reference Section 01 74 00, Cleaning for cleaning requirements.

### 3.9 INSTALLATION

- A. Confirm Installation requirements in Division 01, General Requirements, Section 28 00 01, Electronic Safety Basic Requirements and individual Division 28, Electronic Safety Sections.
- B. Install equipment in accordance with manufacturer's installation instructions, plumb and level and firmly anchored to building structure. Maintain manufacturer's recommended clearances.
- C. Startup equipment, in accordance with manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.
- D. Provide miscellaneous supports required for installation of equipment, conduit and wiring.

### 3.10 PAINTING

- A. Reference Section 09 91 23, Painting and Coating, for painting requirements.

### 3.11 ACCESS PANELS

- A. Comply with individual Division 28, Electronic Safety Sections and coordinate locations/sizes of access panels with Owner prior to work.

### 3.12 DEMOLITION

- A. Comply with individual Division 28, Electronic Safety Sections and the following:
  - 1. Scope:
    - a. It is the intent of these documents to provide necessary information and adjustments to electronic safety system required to meet code, and accommodate installation of new work.

- b. Existing Conditions: Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to exactly locate and preserve underground utilities. Replace damaged items with new material to match existing. Promptly notify Owner if utilities are found which are not shown on Drawings.
  - c. Coordinate with Owner so that work can be scheduled not to interrupt operations, normal activities, building access, access to different areas. Owner will cooperate to best of their ability to assist in coordinated schedule, but will remain final authority as to time of work permitted.
2. Examination:
- a. Determine exact location of existing utilities and equipment before commencing work, compensate Owner for damages caused by failure to locate and preserve utilities. Replace damaged items with new material to match existing.
  - b. Verify that abandoned wiring and equipment serve only abandoned facilities.
  - c. Demolition drawings are based on casual field observation and existing as-built documents.
    - 1) Verify accuracy of information shown prior to bidding and provide such labor and material as is necessary to accomplish work.
    - 2) Verify location and number of electronic safety system devices, panels, etc. in field.
  - d. Report discrepancies to Owner before disturbing existing installation.
3. Promptly notify Owner if systems are found which are not shown on Drawings.
4. Execution:
- a. Remove existing electronic safety equipment, devices and associated wiring from walls, ceilings, floors, and other surfaces scheduled for remodeling, relocation, or demolition unless shown as retained or relocated on Drawings.
  - b. Provide temporary wiring and connections to maintain electrical continuity of existing systems during construction. Remove or relocate electrical boxes, conduit, wiring and equipment as encountered in removed or remodeled areas in existing construction affected by this work.
  - c. Remove and restore wiring which serves usable existing outlets clear of construction or demolition.
  - d. If existing junction boxes will be made inaccessible, or if abandoned outlets serve as feed through boxes for other existing electrical equipment which is being retained, provide new conduit and wire to bypass abandoned outlets.
  - e. If existing conduits pass through partitions or ceiling which are being removed or remodeled, provide new conduit and wire to reroute clear of construction or demolition and maintain service to existing load.
  - f. Extend circuiting and devices in existing walls to be furred out.
  - g. Remove abandoned wiring to source of supply.
  - h. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
  - i. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

- j. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
  - k. Remove abandoned wiring to leave site clean.
  - l. If existing electrical equipment contains PCBs (Polychlorinated Biphenyl), replace with new non-PCB equipment. Dispose of material containing PCBs as required by federal and local regulations.
  - m. Repair adjacent construction and finishes damaged during demolition work.
  - n. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
5. Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections.
- a. Notify Owner before partially or completely disabling system.
  - b. Notify local fire service.
  - c. Make notifications at least 5 working days in advance.
  - d. Make temporary connections to maintain service in areas adjacent to work area.

### 3.13 ACCEPTANCE

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 28, Electronic Safety Sections and the following:
- 1. System cannot be considered for acceptance until work is completed and demonstrated to Owner that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
    - a. Cleaning
    - b. Operation and Maintenance Manuals
    - c. Training of Operating Personnel
    - d. As-Built Drawings
    - e. Warranty and Guaranty Certificates
    - f. Start-up/test Documents and Commissioning Reports

### 3.14 FIELD QUALITY CONTROL

- A. Confirm requirements in Division 01, General Requirements. In absence of specific requirements, comply with individual Division 28, Electronic Safety Sections and the following:
- 1. Tests:
    - a. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in Closeout Documents.
    - b. During site evaluations by Owner or Engineer, provide appropriate personnel with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.

END OF SECTION

SECTION 28 0800  
COMMISSIONING OF FIRE ALARM

PART 1 - GENERAL

1.1 SUMMARY

A. Work included:

1. Fire alarm devices, panels, alarming, call-out, labeling, sequencing, elevator recall, fire dampers and interface with HVAC.

B. Summary:

1. Fire alarm commissioning requirements are included in this Section.
2. Commissioning is the process of reviewing system installation and operation to confirm the systems are installed and operating per the design intent and contract documents. It does not replace the official testing and acceptance of the authority having jurisdiction.

C. Definitions:

1. Reference Division 28, Electronic Safety and Division 01, General Requirements.
2. Commissioning Authority: Commissioning Agent, representing the Owner and directing commissioning activities.

1.2 RELATED SECTIONS

- A. Contents of Division 28, Electronic Safety and Division 01, General Requirements apply to this Section.

1.3 REFERENCES AND STANDARDS

- A. References and Standards as required by Division 28, Electronic Safety and Division 01, General Requirements.

B. In addition, meet the following:

1. ASHRAE Guideline 0 - The Commissioning Process
2. NFPA 3 - Recommended Practice for Commissioning and Integrated Testing of Fire Protection and Life Safety Systems

1.4 SUBMITTALS

- A. Submittals as required by Division 28, Electronic Safety and Division 01, General Requirements.

B. In addition, submit the following:

1. NFPA 72 Record of Completion
2. Smoke Detector Sensitivity Report
3. Alarm Signal Audibility (dB) Levels Report

4. Emergency Voice/Alarm Communication System Intelligibility Report

1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Division 28, Electronic Safety and Division 01, General Requirements.

1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Division 28, Electronic Safety and Division 01, General Requirements.
- B. In addition, provide:
1. Manufacturer's Warranty.
  2. Commissioning, inspecting, and testing not to modify terms or time periods of fire alarm equipment, systems, and controls warranties including related equipment and systems, and adjacent work.
  3. Fire Alarm system warranties to start from date of Substantial Completion.

1.7 COORDINATION

- A. Coordination as required by Division 28, Electronic Safety and Division 01, General Requirements.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Provide testing equipment required to perform startup, initial checkout and functional performance testing for the equipment being tested under Division 28, Electronic Safety. Furnish two-way radios for each testing participant.
- B. Testing equipment to be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications.

PART 3 - EXECUTION

3.1 GENERAL DOCUMENTATION REQUIREMENTS

- A. With assistance from the installing contractors, the Commissioning Authority will prepare Pre-Functional Checklists for commissioned systems.
- B. Red-Lined Drawings:
1. Verify equipment, devices and wiring are shown correctly on red-lined drawings.
  2. Record the red-lined drawing changes, as a result of Functional Testing and incorporate into the final As-Built Drawings.
- C. Operation and Maintenance Data:
1. Submit a copy of O&M literature within 45 days of each submittal acceptance for use during the commissioning process for commissioned equipment and systems.
  2. The Commissioning Authority will review the O&M literature once for conformance to project requirements.



3. The Commissioning Authority will receive a copy of the final approved O&M literature once corrections have been made by the Contractor.

D. Demonstration and Training:

1. Provide demonstration and training as required by the specifications.
2. Submit complete training plan and schedule to the Commissioning Authority four weeks prior to training.
3. Submit training agenda for each training session to the Commissioning Authority one week prior the training session.
4. Notify the Commissioning Authority at least 72 hours in advance of scheduled tests so testing may be observed by the Commissioning Authority and Owner's representative. Submit copies of the test record to the Commissioning Authority and Owner.
5. Engage a Factory-authorized service representative to train Owner's maintenance personnel to operate and maintain specific equipment.
6. Train Owner's maintenance personnel on procedures and schedules for trouble shooting, servicing, and maintaining equipment.
7. Review data in O&M Manuals.

3.2 CONTRACTOR'S RESPONSIBILITIES

- A. Provide submittals to the Commissioning Authority for review.
- B. Provide information requested by the Commissioning Authority for final commissioning documentation.
- C. Prepare preliminary schedule for fire alarm system orientation and inspections, operation and maintenance manual submissions, training sessions and functional performance testing for Owner. Distribute preliminary schedule to commissioning team members.
- D. With input from the Commissioning Authority, update the construction schedule as required with detailed commissioning tasks throughout the construction period.
- E. During the startup and initial checkout process, execute the related portions of the prefunctional checklists for commissioned equipment.
- F. Provide ladders, radios, smoke sound level meter, and intelligibility meter to facilitate the commissioning process.
- G. Gather operation and maintenance literature on equipment, and assemble in binders as required by the specifications. Submit to Commissioning Authority 45 days after submittal acceptance.
- H. Provide any proprietary equipment required to verify the fire alarm functionality.
- I. Pretest all fire alarm components and controls and correct all deficiencies prior to scheduling the Commissioning Authority for functional performance testing.
- J. Coordinate with the Commissioning Authority to provide 48-hour advance notice so the witnessing of equipment and system testing can begin.
- K. Perform commissioning tests at the direction of the Commissioning Authority.

- L. Participate in, and schedule vendors and contractors to participate in the training sessions.

### 3.3 TESTING PREPARATION

- A. Provide written notification to the Commissioning Authority that the following work has been completed in accordance with the contract documents, and that the equipment, systems, and sub-system are operating as required:
  - 1. Detection devices are installed, powered, programmed, labeled and pre-tested.
  - 2. Notification appliances are installed, powered, synchronized, and pre-tested.
  - 3. Smoke/fire dampers are powered and pre-tested and provided with access panel for visual inspection.
  - 4. Smoke barriers and smoke control fans are started up and air flow balanced.
  - 5. Fire alarm associated supply and/or exhaust fan shutdown are programmed and pre-tested.
  - 6. Smoke control fans are balanced and power is monitored
  - 7. Fire door releases are powered, programmed, adjusted and pre-tested.
  - 8. Elevator recall programmed and pre-tested.
  - 9. Fire alarm control panel programmed per fire alarm sequence of operation.
  - 10. Communication between the FACP and Central Station verified.
  - 11. Emergency power systems pre-tested and labeled.
  - 12. Check safety cutouts, alarms, and interlocks with smoke control and life-safety systems during each mode of operation.
- B. Prior to scheduling the Commissioning Authority for commissioning tests, certify in writing that testing procedures have been completed and that testing reports have been submitted, discrepancies corrected, and corrective work approved.

### 3.4 GENERAL TESTING REQUIREMENTS

- A. Functional performance testing of the fire alarm system, as observed by the Commissioning Authority, may not begin until the Fire Alarm contractor has completed all required pre-testing checklists and documentation.
- B. The Commissioning Authority along with the fire alarm contractor to prepare detailed testing plans, procedures, and checklists for fire alarm systems, subsystems, and devices.
- C. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the Commissioning Authority.
- D. Scope of fire alarm testing includes the entire fire alarm installation, from the incoming power throughout the entire distribution system. Testing includes detection, monitoring, activation, annunciation, programming, and communications .
- E. Test operating modes, interlocks, control responses and responses to abnormal or trouble conditions, and verify proper response of fire alarm system control equipment and devices.

- F. If tests cannot be completed because of a deficiency outside the scope of the fire alarm system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

### 3.5 FIRE ALARM SYSTEMS, SUBSYSTEMS AND EQUIPMENT TESTING PROCEDURES

- A. Functional Performance Testing Procedures shall include the following components and parties involved:
- B. Fire Alarm Control Panel: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all initiating devices, alarming devices and programming associated with the fire alarm control panel operate per the fire alarm sequence of operation and contract documents.
- C. Fire Alarm Remote Annunciator: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all initiating devices, alarming devices and programming associated with the fire alarm control panel operate per the fire alarm sequence of operation and contract documents
- D. Initiation Devices: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all initiating devices are located, labeled, annunciate correctly at the FACP and function per the fire alarm sequence of operation and contract documents.
- E. Manual Pull Stations: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all manual pull stations are located, labeled, annunciate correctly at the FACP and function per the fire alarm sequence of operation and contract documents.
- F. Smoke Detectors: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all smoke detection devices are located, labeled, annunciate at the FACP and function per the fire alarm sequence of operation and contract documents. This may be conducted using either a listed canned aerosol smoke approved by the manufacturer or other method approved.
- G. Duct Mounted Smoke Detectors: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all duct smoke detection devices are located, labeled, annunciate at the FACP and function per the fire alarm sequence of operation and contract documents. Verify air flow through detector by using a manometer or other manufacturer approved test.
- H. Heat Detectors: The Commissioning Authority will witness the Fire Alarm contractor perform field tests using a heat gun as described in the Functional Performance Tests to ensure all heat detection devices are located, labeled, annunciate at the FACP and function per the fire alarm sequence of operation and contract documents. Do not use application of heat to test non-restorable fixed temperature detectors.
- I. Magnetic Door Holders: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all magnetic door holders are provided and function per the fire alarm sequence of operation and contract documents. This test will include verifying the door completely closes and latches as required.
- J. Fire Alarm Notification Appliances: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all notification devices are located, labeled, and operates in sync with each other per the contract documents.

- K. Fire Suppression Flow and Tamper Switches: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all flow and tamper detection switches are located, labeled, annunciate at the FACP and function per the fire alarm sequence of operation and contract documents.
  - L. Emergency Voice Alarm Communication: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure the automatic voice evacuation activates upon fire alarm activation and verify each speaker annunciates per the contract documents. Perform intelligibility test per NFPA 72 requirements.
  - M. Elevator Interface: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure the elevators recall to the appropriate floor upon fire alarm activation per the contract documents.
  - N. Air Sampling Type Smoke Detector: The Commissioning Authority will witness the Fire Alarm contractor perform field tests as described in the Functional Performance Tests to ensure all detection devices are located, labeled, annunciate at the FACP and function per the fire alarm sequence of operation and contract documents. This may be conducted using canned aerosol smoke approved by the manufacturer, pressure testing and testing of relay devices.
- 3.6 DEFICIENCIES/NON-CONFORMANCE, COST OF RETESTING, FAILURE DUE TO MANUFACTURER DEFECT
- A. Reference Division 01, General Requirements for requirements pertaining to deficiencies/non-conformance, cost of retesting, or failure due to manufacturer defect.
- 3.7 OPERATION AND MAINTENANCE MANUALS
- A. The Operation and Maintenance Manuals to conform to Contract Documents requirements as stated in Division 28, Electronic Safety and Division 01, General Requirements.
- 3.8 TRAINING OF OWNER PERSONNEL
- A. Fire Alarm Contractor Training Responsibilities:
    - 1. Provide the Commissioning Authority with a training plan four weeks before the planned training.
    - 2. Provide designated Owner personnel with comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
    - 3. Training starts with classroom sessions, if necessary, followed by hands on training on each piece of equipment, which illustrates the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
    - 4. During any demonstration, should the system fail to perform in accordance with the requirements of the Operations and Maintenance (O&M) manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
    - 5. The appropriate trade or manufacturer's representative provides the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.

6. The training sessions follows the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals and record drawings for reference.
  7. Training Includes:
    - a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
    - b. Include a review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions.
    - c. Discuss warranties and guarantees.
    - d. Cover common troubleshooting problems and solutions.
    - e. Explain information included in the O&M manuals and the location of plans and manuals in the facility.
    - f. Discuss any peculiarities of equipment installation or operation.
  8. Fully explain and demonstrate the operation, function and overrides of any local packaged controls, not controlled by the central control system.
- B. Schedule training after functional testing is complete, unless approved otherwise by the Owner.

END OF SECTION

SECTION 28 3100  
FIRE DETECTION AND ALARM

PART 1 - GENERAL

1.1 SUMMARY

- A. Work Included:
  - 1. Fire Alarm Control Unit
  - 2. Fire Alarm Transmitter
  - 3. Fire Alarm Annunciators
  - 4. Fire Alarm Addressable Initiating and Control Devices
  - 5. Fire Alarm Addressable Notification Appliances
- B. In addition, remove existing fire alarm system.

1.2 RELATED SECTIONS

- A. Contents of Division 28, Electronic Safety and Division 01, General Requirements apply to this Section.
- B. Division 26, Electrical requirements apply to this section.

1.3 REFERENCES AND STANDARDS

- A. References and Standards as required by Division 28, Electronic Safety and Division 01, General Requirements.
- B. In addition, meet the following:
  - 1. NFPA 72, National Fire Alarm and Signaling Code, adopted edition.
  - 2. NFPA 70, National Electrical Code, adopted edition.
  - 3. FM Data Sheet 5-40, Fire Alarm Systems.

1.4 SUBMITTALS

- A. Submittals as required by Division 28, Electronic Safety and Division 01, General Requirements.
- B. In addition, provide:
  - 1. Shop drawings to include the following:
    - a. Identification of system designer and evidence of qualification or certification of designer as required by AHJ.
    - b. System designer NICET certification number or Engineer's signature and seal.
    - c. Floor plans indicating walls, doors, partitions, room descriptions, device/component locations.
    - d. Ceiling height and ceiling construction details.

- e. A symbol legend with device catalog number, description, back box size and mounting requirements.
  - f. Detailed riser diagram.
  - g. Device address adjacent to each device symbol. Notification appliance circuit and number adjacent to each notification appliance symbol.
  - h. Point to point wiring indicating the quantity and gauge of the conductors and size of conduit/raceway used.
  - i. Wiring connection diagrams for control equipment, annunciators, power supplies, chargers, initiating devices, notification appliances, components being connected to the system and interfaces to associated equipment.
  - j. Battery calculations for each battery backed fire alarm control unit.
  - k. Voltage drop calculations for each notification appliance circuit, indicating individual appliance current draw, conductor run length and size.
  - l. Complete sequence of operation.
2. Prior to Final Completion, submit a letter confirming that inspections have been completed and system is installed and functioning in accordance with Specifications. Include manufacturer representative's certification of installation and letter of warranty.
  3. Operation and Maintenance Manuals. Provide manuals containing the following:
    - a. Catalog Cut Sheets
    - b. System Components, Initiating Devices and Notification Appliances' Installation Sheets
    - c. Manufacturer's Installation, Operation and Maintenance Manual
    - d. Program Data File Printout
    - e. Program Data File on Electronic Storage Media
    - f. As-Built Drawings
    - g. As-Built Drawings on Electronic Storage Media
    - h. One year warranty agreement including parts and labor. Warranty period begins upon date of completion.
    - i. Record of Completion
    - j. Test Reports
    - k. Instruction Chart

#### 1.5 QUALITY ASSURANCE

- A. Quality assurance as required by Division 28, Electronic Safety and Division 01, General Requirements.
- B. Meet City of Corvallis, Oregon requirements, ordinances and amendments.
- C. Meet Oregon State University Fire Alarm Standards requirements.

#### 1.6 WARRANTY

- A. Warranty of materials and workmanship as required by Division 28, Electronic Safety and Division 01, General Requirements.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Furnish fire alarm control equipment specified in this Section by one manufacturer:
  - 1. Simplex 4100ES
  - 2. Or approved equivalent.
- B. Notification Appliance Circuit Panels:
  - 1. Basis of Design: Same manufacturer as fire alarm control equipment.
  - 2. Or approved equivalent.
- C. Fire Alarm Transmitters:
  - 1. Basis of Design: Bosch B465.
  - 2. Or approved equivalent.
- D. Addressable Initiating and Control Devices:
  - 1. Basis of Design: Same manufacturer as fire alarm control equipment.
- E. Addressable Notification Appliances: Notification appliances must be compatible with control equipment and notification appliance circuit panels.
  - 1. Basis of Design: Same manufacturer as control equipment.
  - 2. Or approved equivalent.
- F. Substitutions:
  - 1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
  - 2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with contract documents.
  - 3. Contractor will furnish complete documentation to achieve approval from the Authority Having Jurisdiction for any approved substitution requests.
- G. Equipment to be supplied by a certified manufacturer representative.

### 2.2 COMPONENTS

- A. General:
  - 1. Provide flush mounted units where installed in finished areas.
  - 2. In unfinished areas, surface mounted units are acceptable, unless otherwise noted.
- B. Fire Alarm Control Unit:
  - 1. Multiprocessor Based: Configurable as an analog/addressable, point identified system.



2. Network Module: Provide system network modules to facilitate peer-to-peer communications between fire alarm control units and network annunciators.
3. CPU:
  - a. CPU continuously monitors the communications and data processing cycles of microprocessor. CPU failure generates an audible and visual trouble signal on control panel and remote annunciators.
  - b. House the CPU in fire alarm cabinet with sufficient space to allow maximum system expansion and to enclose alphanumeric display.
  - c. Retain basic life safety software in field programmable non-volatile memory. Provide CPU with capacity of minimum of 250 addressable points.
  - d. Equip CPU with software to provide a control-by-event feature, whereby receipt of an alarm point is programmed to operate control points within system. Provide control-by-event actions for life safety functions in programmable non-volatile memory. CPU software programming for control of systems defined in this Section is installed as part of this Section.
4. System Capabilities:
  - a. System capable of addressing and operating smoke detectors, manual pull stations, open contact devices and addressable auxiliary control relays on the same communication loop.
  - b. System capable of displaying analog value of each smoke detector, address and condition of fire alarm monitoring points.
5. Program Software:
  - a. Field configuration program provides programmable operating instructions for system. Store resident program in non-volatile memory.
  - b. Programmed control point activation includes selective control of fire door release, elevator recall or other fire safety and auxiliary functions.
  - c. Devices meet criterion specified under materials.
  - d. Verification and display of sensitivity of each addressable smoke detector can be read using the operating software. Replace devices with readings outside of allowed value at time of system check out.
6. Control Panel Display Modules:
  - a. Provide keyboard display module 80-character backlit LCD. Each alarm/trouble condition appears in English language with description and location of alarm/supervisory/trouble.
  - b. Alarm/supervisory/trouble may be acknowledged, silenced and system reset from control panel or remote annunciator(s).
7. Printer:
  - a. Provide a dot matrix 80-character printer with tractor feed paper take-up.
  - b. Each alarm, supervisory and trouble condition prints in English the type, location, time, and the like.
8. Power Supply: Provide power supply(s), adequate to serve control panel modules, remote annunciators, addressable devices, notification appliances, and other connected devices.

9. Power Requirements:
  - a. Loss of normal and emergency power automatically causes system to transfer to battery power. Indicate battery power operation by yellow lamp and audible annunciation at control panel and remote annunciator panels.
  - b. Upon return of 120VAC power, unit recharges batteries to full capacity and maintains battery on float charge. Provide trickle charge adequate capacity to maintain battery fully charged with automatic rate charge. Provide batteries in locking cabinet manufactured for purpose.
10. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each function in this portion of the Specifications and for equipment interconnections required under electrical and mechanical specifications.
11. Auxiliary Switches: Provide auxiliary equipment control switches with labeled status indicating lights for each switch.
12. System Reset:
  - a. Key-accessible control function returns system to normal, non-alarm state, if initiating circuits have cleared.
  - b. Provide reset on both main fire alarm control panel and remote annunciators.
13. Lamp Test:
  - a. Manual "lamp test" function causes the annunciation lamps to illuminate at fire alarm control and remote annunciator panels.
  - b. Provide "lamp test" function at each annunciator panel.
14. Addressing:
  - a. Provide each initiating device with its own discrete analog address.
- C. Fire Alarm Transmitters:
  1. Electrically supervised, capable of transmitting alarm, supervisory and trouble signals over Ethernet connection and telephone line to campus safety receiver. Signal transmitter interfaces fully with receiver station of local fire department or Owner's selected vendor.
  2. Verify requirements and provide call sequence and message as directed by Owner and the AHJ. Provide Point ID (PID) communication protocol.
- D. Fire Alarm Annunciators:
  1. Alphanumeric Remote Annunciator with Controls: Back lit LCD alphanumeric annunciator 80 characters long. Provide under locking cover test switch, alarm and trouble buzzer, buzzer silence switch and buzzer silence message and reset switch, flush mount with finished cover, vandal-resistant UV stabilized Lexan (or approved equivalent) overlay and required modules, control panel, etc., to drive annunciator. Self-contained, suitable for wet location where located exterior. Verify location with AHJ before installation.
  2. Provide framed floor plan of facility adjacent to the annunciator panel identifying room names/numbers, device/addresses or fire zone number and description as utilized on the annunciator panel, as required by local AHJ. Check with the local fire department for size and approved mounting location.

- E. Fire Alarm Addressable Initiating and Control Devices:
  - 1. Manual Pull Stations:
    - a. Semi-flush single action, red finish, nongrasping operation; maximum pull strength as allowed per ADA criteria.
    - b. Stations do not allow closure without keyed reset.
  - 2. Fixed Temperature Heat Detectors:
    - a. Rated 135 degrees F or 190 degrees F as required by space use.
    - b. Provide off white low profile detectors.
  - 3. Rate-of-Rise and Fixed Temperature Heat Detectors:
    - a. Responding to 15 degrees F temperature rise per minute and to 135 degrees F fixed temperature as required by space use.
    - b. Provide off white low profile detectors.
  - 4. Photoelectric Type Analog Detectors: Analog, panel adjustable sensitivity, LED source, multiple cell, 360 degree smoke entry, visual latching operation indicator, insect screen, functional test switch, two-wire operation and vandal resistant locking feature.
  - 5. Relay Module:
    - a. Signaling line circuit interface module that connects to other building systems for control of fire/life safety functions, e.g., air-handler shutdown, fire/smoke damper closure, elevator recall.
    - b. Module powered from control panel.
  - 6. Control Module:
    - a. Signaling line circuit interface module that provides notification appliance circuits or system control outputs.
    - b. Module powered from control panel.
  - 7. Input Module:
    - a. Signaling line circuit interface module that provides initiating device circuits for connection to contact closure initiating devices.
    - b. Module powered from control panel.
- F. Fire Alarm Addressable Notification Appliances:
  - 1. Combination Horn/Strobe:
    - a. Multi-candela, flush wall and ceiling mount, white finish, insect-proof.
    - b. Provide horn/strobes that meet the latest requirements of NFPA 72, ANSI 117.1 and UL 1971.
    - c. Candela rating 75 cd minimum unless otherwise indicated on Drawings.
  - 2. Strobe:
    - a. Multi-candela, flush wall and ceiling mount, white finish, insect-proof.
    - b. Provide strobes that meet the latest requirements of NFPA 72, ANSI 117.1 and UL 1971.

- c. Candela rating 75 cd minimum unless otherwise indicated on Drawings.
- 3. Horn:
  - a. Flush wall and ceiling mount, white finish, insect-proof.
  - b. Provide horns that meet the latest requirements of NFPA 72.
- 4. Weatherproof/Surface Backboxes:
  - a. Provide manufacturer's weatherproof backbox listed for use with notification appliance in areas where the device is subject to humidity in excess of listed rating.
  - b. Provide manufacturer surface backboxes where devices cannot be installed recessed.
- G. Miscellaneous:
  - 1. Protective Guard: Steel wire guard .
  - 2. Circuit Conductors: Copper or optical fiber; color code and label. Type FPL, FPLR and FPLP as required by NEC. Minimum signaling line circuit and initiating device circuit wire size: AWG18. Minimum notification appliance circuit wire size: AWG14, or as approved by Engineer and Owner. Fiber optic cable as required by manufacturer.
  - 3. Surge Protection:
    - a. In accordance with IEEE C62.41 B3 combination waveform and NFPA 70; except for optical fiber conductors.
    - b. Equipment Connected to Alternating Current Circuits: Maximum let through voltage of 350 V(ac), line-to-neutral, and 350 V(ac), line-to-line; do not use fuses.
  - 4. Batteries:
    - a. Sealed lead acid type.
    - b. Provide additional cabinet, if required due to space limitations in control panels.
  - 5. Locks and Keys:
    - a. Deliver keys to Owner.
    - b. Provide same standard lock and key for each key operated switch and lockable panel and cabinet; provide 5 keys of each type.
  - 6. Instruction Charts:
    - a. Printed instruction chart for operators, showing steps to be taken when signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
    - b. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
  - 7. Document Storage Cabinet:
    - a. Suitable for as-built drawings, operation and maintenance manual, system data file disk, and tools.
    - b. Constructed from steel with baked enamel finish, size adequate for full size drawings, operation and maintenance manual, spare parts and tools.

8. Printer Stand:
  - a. Two shelf, steel construction, gray finish.
  - b. Suitable to contain supply of printer paper below printer.
- H. Spare Materials: Provide extra materials listed below.
  1. Initiating Devices:
    - a. Manual Pull Stations: Provide 1 or 2 percent extra.
    - b. Smoke Detectors: Provide 1 or 6 percent extra.
    - c. Duct Mounted Smoke Detectors: Provide 1 or 2 percent extra.
    - d. Addressable Interface Devices: Provide 1 or 4 percent extra, each type used.
  2. Notification Appliances:
    - a. Combination Horn/Strobes: Provide 1 or 4 percent extra.
    - b. Strobes: Provide 1 or 4 percent extra.
    - c. Isolation Modules: Provide 1 or 4 percent extra.
  3. Miscellaneous:
    - a. Printer Paper: Provide one box compatible with printer.
    - b. Fuses: Provide 2 of each size used in the installed system.

## 2.3 UNIT PRICING

- A. Provide unit pricing for the following pieces of equipment. Unit pricing to include complete installation of devices listed with 40 feet of cable, conduit, if required, connections, programming, battery capacity and the like.
  1. Manual pull station.
  2. Photoelectric smoke detector.
  3. Duct mounted smoke detector.
  4. Horn/strobe appliance.
  5. Strobe appliance.

## PART 3 - EXECUTION

### 3.1 DESIGN CRITERIA

- A. System Operation
  1. Alarm Sequence of Operation:
    - a. Activation of manual fire alarm box, automatic fire detector, or fire extinguishing system causes system to enter "alarm" mode including the following operations:
      - 1) Local English language annunciation of device location, address and condition, and audible and visual alarm signal at control panel and remote annunciators.

- 2) Manual "acknowledge" function at control panel and remote annunciators to silence audible alarm signal, visual signal remains displayed until initiating alarm is cleared.
  - 3) Transmit "alarm" signal to off-premises equipment, i.e., to local fire department or Owner's selected vendor. Provide necessary connections to transmitter.
  - 4) Activate fire alarm notification appliances. Smoke detectors initiate an alarm verification operation prior to activation of the notification appliances.
  - 5) Transmit signal to release fire doors.
  - 6) Transmit signals to elevator control equipment to initiate elevator recall and shunt trip.
  - 7) Transmit signal to building access/security system.
2. Supervisory Sequence of Operation:
- a. Fire sprinkler tamper or supervisory pressure switch activation causes system to enter "supervisory" mode including the following operations:
    - 1) Local English language annunciation of device location, address and condition, and audible and visual supervisory signal at control panel and remote annunciators.
    - 2) Manual "acknowledge" function at control panel and remote annunciators to silence audible supervisory signal, visual signal remains displayed until initiating supervisory is cleared.
    - 3) Transmit "supervisory" signal to off-premises equipment.
3. Trouble Sequence of Operation:
- a. System trouble, including single ground or open of supervised circuit, or power or system failure, causes system to enter "trouble" mode including the following operations:
    - 1) Local English language annunciation of device location, address and condition, and audible and visual trouble signal at control panel and remote annunciators.
    - 2) Manual "acknowledge" function at control panel and remote annunciators to silence audible trouble signal, visual signal remains displayed until initiating trouble is cleared.
    - 3) Transmit "trouble" signal to off-premises equipment.
- B. Circuits:
1. Signaling Line Circuits (SLC): Class B, Style 4.
  2. Notification Appliance Circuits (NAC): Class B.
- C. Spare Capacity:
1. Notification Appliance Circuits: Minimum 25 percent spare current capacity. Utilize UL maximum current draw values for notification appliances. Maximum 10 percent voltage drop.
  2. Signaling Line Circuit: Minimum 25 percent spare capacity.

D. Power Sources:

1. Primary: Dedicated branch circuits of facility power distribution system.
2. Secondary: Storage batteries.
3. Capacity: Sufficient to operate fire alarm system under normal supervisory condition for 24 hours and operate alarm signals for 15 minutes at end of standby period.

3.2 INSTALLATION

- A. Obtain approval of system design from AHJ prior to installation. Do not begin installation without approval from AHJ and submittal review comments from Engineer and Owner.
- B. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the Contract Documents.
- C. In accordance with manufacturer's instructions, provide wiring, conduit and outlet boxes required for the erection of a complete system as described in these specifications, as shown on Drawings, and as required by AHJ.
- D. Provide wiring to meet the requirements of national, state and local electrical codes. Provide color coded wiring as recommended and specified by the fire alarm and detection system manufacturer. Provide Type FPLR cable when in a riser application or FPLP cable when installed in plenums.
- E. Conceal wiring, conduit, boxes, and supports where installed in finished areas.
- F. Provide complete raceway system for wiring. Where raceway cannot be concealed, provide surface raceway in finished areas and surface mounted EMT in non-finished areas. Minimum 3/4-inch trade size EMT except 1/2-inch allowed for single service runs.
- G. Provide cabling and conduits system suitable for wet locations for below grade systems.
- H. At junction boxes and termination points, provide identification tags on wires and cables.
- I. Route wiring to avoid blocking access to equipment requiring service, access, or adjustment.
- J. Provide machine printed address label on addressable devices visible from the floor without magnification.
- K. Obtain Owner's approval of locations of devices, before installation.
- L. Install instruction cards in or adjacent to control panel.
- M. Provide control panel and remote power supplies with 120VAC dedicated circuit per NFPA requirements.
- N. Do not install cabinets or equipment below the battery cabinet. Do not locate battery and charging system cabinets in ceiling space.
- O. Provide wire guards or protective covers where device is subject to abuse and where required by AHJ.
- P. Provide document storage cabinet adjacent to fire alarm control panel.
- Q. Provide instruction charts at each control unit where system operations are performed. Obtain approval of Owner prior to mounting.

- R. Provide conduit and wiring for connections to the transmitter as required for fire alarm system off site supervision.
- S. Perform system programming at the fire alarm control panel. Program the system without shutting the system down. Programming is done off line. Update and maintain hard copy and CD-ROM copy of program at the site.
- T. Room Name Labeling: Control unit schedules, programming, and labeling for electrical equipment, to use the room names and room numbers that the Owner adopts at the date of substantial completion of construction. This work is to be done at no added cost to the Owner.

### 3.3 FIRE SAFETY SYSTEMS INTERFACES

- A. Provide conduit, wiring, boxes and terminations from fire alarm system to monitored components.
  - 1. Alarm Inputs:
    - a. Provide connection in accordance with NFPA 72 for the following systems and components:
      - 1) Fire sprinkler water flow switches.
  - 2. Supervisory Inputs:
    - a. Provide connection in accordance with NFPA 72 for the following systems and components:
      - 1) Fire sprinkler water control valve tamper switches.
      - 2) Other supervisory inputs.
- B. Fire Safety Functions:
  - 1. Provide power and control conduit, wiring, boxes and terminations to power devices and interface to fire alarm system.
    - a. Doors:
      - 1) Provide smoke detectors and addressable control relays to release magnetic hold open devices and roll-down fire doors and door locks. Verify requirements and quantities prior to bidding.
      - 2) Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door.
      - 3) Electronic Locks or Electromagnetic Door Locks on Egress Doors: Unlock smoke zone egress doors upon activation of any alarm initiating device or suppression system in smoke zone.
      - 4) Overhead Coiling Fire Doors: Release upon activation of smoke detectors on either side of door.
    - b. Elevators:
      - 1) Provide elevator recall smoke detectors, addressable control relays, and connection to elevator equipment per NFPA 72 and as required by the AHJ.
      - 2) Elevator Lobby and Machine Room Smoke Detectors: Elevator recall for fire fighters' service.



### 3.4 EXISTING COMPONENTS

- A. Existing Fire Alarm System: Maintain fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until new equipment is accepted. Remove tags from new equipment when put into service and tag existing fire alarm equipment "NOT IN SERVICE" until removed from building.
- B. Equipment Removal:
  - 1. Remove existing system after acceptance of new fire alarm system. Restore damaged surfaces.
  - 2. Package operational fire alarm and detection equipment that has been removed and deliver to Owner.
  - 3. Remove from site and legally dispose of remainder of existing material.

### 3.5 INSPECTION AND TESTING FOR COMPLETION

- A. System testing and commissioning to be performed by a certified manufacturer representative.
- B. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- C. Document audibility and intelligibility measurements for each space on As-Built Drawings.
- D. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- E. Provide tools, software, and supplies required to accomplish inspection and testing.
- F. Prepare for testing by ensuring that work is complete and correct; perform preliminary tests as required to test system.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- H. Notify Owner 7 days prior to beginning completion inspections and tests.
- I. Notify Authorities Having Jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- J. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
  - 1. Record all system operations and malfunctions.
  - 2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
  - 3. Owner will provide attendant operator personnel during diagnostic period; schedule training to allow Owner personnel to perform normal duties.
  - 4. At end of successful diagnostic period, complete and submit NFPA 72 "Inspection and Testing Form."

### 3.6 OWNER PERSONNEL INSTRUCTION

- A. Provide the following instruction to designated Owner personnel:
  - 1. Hands-On Instruction: On-site, using operational system.
  - 2. Classroom Instruction: Owner furnished classroom, on-site or at other local facility.
- B. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
  - 1. Initial Training: 1 session pre-closeout.
  - 2. Refresher Training: 1 session post-occupancy.
- C. Detailed Operation: Two-hour sessions for engineering and maintenance staff; combination of classroom and hands-on:
  - 1. Initial Training: 1 session pre-closeout.
  - 2. Refresher Training: 1 session post-occupancy.
- D. Furnish the services of instructors and teaching aids; have copies of operation and maintenance data and As-Built Drawings available during instruction.
- E. Provide means of evaluation of trainees suitable to type of training given; report results to Owner.

### 3.7 CLOSEOUT

- A. Closeout Demonstration:
  - 1. Demonstrate proper operation of functions to Owner.
  - 2. Be prepared to conduct any of the required tests.
  - 3. Have at least one copy of operation and maintenance data, copy of project As-Built Drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
  - 4. Have authorized technical representative of control unit manufacturer present during demonstration.
  - 5. Demonstration may be combined with inspection and testing required by AHJ. Notify AHJ in time to schedule demonstration.
  - 6. Repeat demonstration until successful.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
  - 1. Specified diagnostic period without malfunction has been completed.
  - 2. Approved operating and maintenance data has been delivered.
  - 3. Spare parts, extra materials, and tools have been delivered.
  - 4. All aspects of operation have been demonstrated to Owner.

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5. Final acceptance of the fire alarm system has been given by Authorities Having Jurisdiction.
  6. Occupancy permit has been granted.
  7. Specified pre-closeout instruction is complete.
- C. Perform post-occupancy instruction within 3 months after Final Completion.

END OF SECTION