

RFB NO. 314001



# CONSTRUCTION DOCUMENTS PROJECT MANUAL

DANE COUNTY DEPARTMENT OF PUBLIC WORKS,  
HIGHWAY AND TRANSPORTATION

**PUBLIC WORKS ENGINEERING DIVISION**  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713

**REQUEST FOR BIDS NO. 314001**  
**BUILDINGS C & D NEIGHBORHOODS REMODEL**  
**BADGER PRAIRIE HEALTH CARE CENTER**  
**1100 EAST VERONA AVENUE**  
**VERONA, WISCONSIN**

Due Date / Time: **THURSDAY, SEPTEMBER 11, 2014 / 2:00 P.M.**

Location: **PUBLIC WORKS OFFICE**

Performance / Payment Bond: **100% OF CONTRACT AMOUNT**

Bid Deposit: **5% OF BID AMOUNT**

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FOR INFORMATION ON THIS REQUEST FOR BIDS, PLEASE CONTACT:

SCOTT CARLSON, PROJECT MANAGER  
TELEPHONE NO.: 608/266-4179  
FAX NO.: 608/267-1533  
E-MAIL: CARLSON.SCOTT@COUNTYOFDANE.COM

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SEALS PAGE

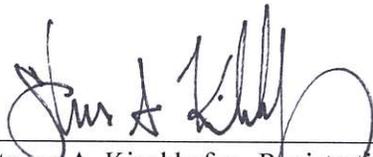
BID NO. 314001

PROJECT: BUILDINGS C & D NEIGHBORHOODS REMODEL  
BADGER PRAIRIE HEALTH CARE CENTER

ARCHITECT

I hereby certify that this drawing, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Architect under the laws of the State of Wisconsin.

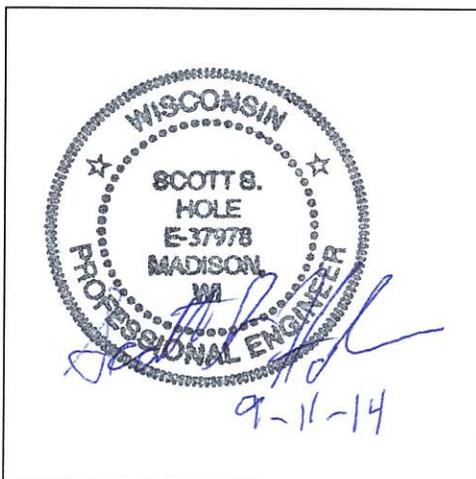


  
Steven A. Kieckhafer - Registration No. A-8378

Dated: September 11, 2014

ELECTRICAL ENGINEER

I hereby certify that this drawing, specification or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Wisconsin.



  
Scott Hole - Registration No. 37978-6

Dated: September 11, 2014

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## LEGAL NOTICE

### INVITATION TO BID

Dane County Public Works, Highway & Transportation Dept., 1919 Alliant Energy Center Way, Madison, WI 53713, will receive sealed Bids until:

**2:00 P.M., THURSDAY, OCTOBER 2, 2014**

#### **REQUEST FOR BIDS NO. 314001**

#### **BUILDINGS C & D NEIGHBORHOODS REMODEL**

#### **BADGER PRAIRIE HEALTH CARE CENTER**

**1100 EAST VERONA AVENUE**

**VERONA, WISCONSIN**

Dane County is inviting Bids for construction services. An existing 16-bed neighborhood shall be subdivided to optionally allow operation as two 8-bed households. This will involve modification of doors, hardware & associated sophisticated electronic controls. This work may be replicated in a second building. New outdoor patios may also be included along with other minor changes. Only firms with capabilities, experience & expertise with similar projects should obtain this Request for Bids document & submit Bids.

Request for Bids document may be obtained after **2:00 p.m. on Thursday, September 11, 2014** by downloading it from [countyofdane.com/pwbids](http://countyofdane.com/pwbids). Please call Scott Carlson, Project Manager, at 608/266-4179, or our office at 608/266-4018, for any questions or additional information.

All Bidders must be a registered vendor with Dane County & pay an annual registration fee & must be pre-qualified as a Best Value Contractor before award of Contract. Complete Vendor Registration Form at [danepurchasing.com/registration](http://danepurchasing.com/registration) or obtain one by calling 608/266-4131. Complete Pre-qualification Application for Contractors at [countyofdane.com/pwht/BVC\\_Application.aspx](http://countyofdane.com/pwht/BVC_Application.aspx) or obtain one by calling 608/266-4029.

A pre-bid facility tour will be held Wednesday, September 24, 2014 at 1:00 p.m. at Badger Prairie Health Care Center, 1100 East Verona Ave., starting in the Lobby. Bidders are strongly encouraged to attend this optional tour.

**PUBLISH:    SEPTEMBER 12 & 18, 2014 - WISCONSIN STATE JOURNAL**  
**SEPTEMBER 12 & 18, 2014 - THE DAILY REPORTER**



# DANE COUNTY DEPARTMENT of PUBLIC WORKS, HIGHWAY and TRANSPORTATION

County Executive  
Joseph T. Parisi

1919 Alliant Energy Center Way ♦ Madison, Wisconsin 53713  
Phone: (608) 266-4018 ♦ FAX: (608) 267-1533

Commissioner / Director  
Gerald J. Mandli

## BEST VALUE CONTRACTING APPLICATION

### CONTRACTORS / LICENSURE APPLICANTS

The Dane County Department of Public Works requires all contractors to be pre-qualified as a best value contractor with the County prior to being awarded a contract. In addition, the County pre-qualifies potential contractors and sub-contractors who wish to work on County contracts. Subcontractors must become pre-qualified ten (10) days prior to commencing work under any Dane County Public Works Contract. Potential subcontractors are urged to become pre-qualified as early as possible. This document shall be completed, properly executed, along with the necessary attachments and additional information that the County requires for the protection and welfare of the public in the performance of a County contract.

Contractors or subcontractors of any tier who attain pre-qualification status will retain that status for a period of two (2) years from the date of qualification. Contractors shall notify the Dane County Department of Public Works, Highway & Transportation within fifteen (15) days of any changes to its business or operations that are relevant to the pre-qualification application. Failure to do so could result in suspension, revocation of the contractor's pre-qualification, debarment from County contracts for up to three (3) years and / or other sanctions available under the law.

No contracts will be awarded for construction work performed on Dane County projects unless the contractor is currently approved as a Wisconsin Trade Trainer or has applied for approval as an Apprenticeship Trade Trainer to the Wisconsin Department of Workforce Development and agrees to an acceptable apprenticeship program. If you are not currently approved as a Wisconsin Trade Trainer, or have not applied for approval as an Apprenticeship Trade Trainer, please contact the Department of Workforce Development - Bureau of Apprenticeship Standards at 608/266-3133 or visit their web site at: [dwd.wisconsin.gov/apprenticeship/](http://dwd.wisconsin.gov/apprenticeship/).

### EXEMPTIONS

- Contractors who employ less than five (5) apprenticeable trade workers are not required to pre-qualify.
- Contractors performing work that does not apply to an apprenticeable trade, as outlined in Appendix A.
- The contractor / subcontractor provides sufficient documentation to demonstrate one or more of the following:
  - apprentices are not available in a specific geographic area;
  - the applicable apprenticeship program is unsuitable or unavailable; or
  - there is a documented depression of the local construction market which prevents compliance.

SEC.	PROOF OF RESPONSIBILITY	CHECK IF APPLICABLE
1	Does your firm possess all technical qualifications and resources, including equipment, personnel and financial resources, necessary to perform the work required for any project or obtain the same through the use of responsible, pre-qualified subcontractors?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
2	Will your firm possess all valid, effective licenses, registrations or certificates required by federal, state, county, or local law, which are necessary for the type of work to be performed including, but not limited to, those for any type of trade work or specialty work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
3	Will your firm meet all bonding requirements as required by applicable law or contract specifications?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
4	Will your firm meet all insurance requirements as required by applicable law or specifications, including general liability insurance, workers compensation insurance and unemployment insurance requirements?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
5	Will your firm maintain a substance abuse policy for employees hired for public works contracts that comply with Wis. Stats. Sec. 103.503?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
6	Does your firm acknowledge that it must pay all craft employees on public works projects the wage rates and benefits required under Section 66.0903 of the Wisconsin Statutes?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
7	Will your firm fully abide by the equal opportunity and affirmative action requirements of all applicable laws, including County ordinances?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
8	In the past three (3) years, has your firm had control or has another corporation, partnership or other business entity operating in the construction industry controlled it? If so, please attach a statement explaining the nature of the firm relationship?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
9	In the past three (3) years, has your firm had any type of business, contracting or trade license, certification or registration revoked or suspended?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
10	In the past three (3) years, has your firm been debarred by any federal, state or local government agency?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
11	In the past three (3) years, has your firm defaulted or failed to complete any contract?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
12	In the past three (3) years, has your firm committed a willful violation of federal, state or local government safety laws as determined by a final decision of a court or government agency authority.	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
13	In the past three (3) years, has your firm been in violation of any law relating to your contracting business where the penalty for such violation resulted in the imposition of a penalty greater than \$10,000?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach details.
14	Is your firm Executive Order 108 precertified with the State of Wisconsin?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
15	Is your firm an active Wisconsin Trade Trainer as determined by the Wisconsin Bureau of Apprenticeship Standards?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
16	Is your firm exempt from being pre-qualified with Dane County?	Yes: <input type="checkbox"/> No: <input type="checkbox"/> If Yes, attach reason for exemption.
17	Does your firm acknowledge that in doing work under any County Public Works Contract, it will be required to use as subcontractors only those contractors that are also pre-qualified with the County or become so ten days prior to commencing work?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
18	Contractor has been in business less than one year?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
19	Is your firm a first time Contractor requesting a one time exemption, but, intend to comply on all future contracts and are taking steps typical of a "good faith" effort?	Yes: <input type="checkbox"/> No: <input type="checkbox"/>
20	Not applicable. My firm does not intend to work on Best Value Contracts. Note: Best Value Contracting is required to bid on most Public Works Contracts (if unclear, please call Jan Neitzel Knox 608-266-4029).	Yes: <input type="checkbox"/> No: <input type="checkbox"/>

## SIGNATURE SECTION

Your firm's Officer, or the individual who would sign a bid and / or contract documents must sign this document.

I do hereby certify that all statements herein contained are true and correct to the best of my knowledge:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed or Typed Name and Title

NAME AND ADDRESS OF CONTRACTOR	
Name of Firm:	
Address:	
City, State, Zip:	
Telephone Number:	
Fax Number:	
E-mail Address:	

## REMEMBER!

Return all to forms and attachments, or questions to:

**JAN NEITZEL KNOX**  
**EMAIL: NEITZEL-KNOX@COUNTYOFDANE.COM**  
**OFFICE: (608)266-4029, FAX: (608)267-1533**

**DANE COUNTY DEPARTMENT OF PUBLIC WORKS,  
HIGHWAY & TRANSPORTATION  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WI 53713**

# APPENDIX A

## APPRENTICEABLE TRADES

Bricklayer  
Carpenter  
Cement Mason (Concrete Finisher)  
Cement Mason (Heavy Highway)  
Construction Craft Laborer  
Data Communications Installer  
Electrician  
Elevator Mechanic / Technician  
Environmental Systems Technician / HVAC Service Technician / HVAC Install & Service  
Glazier  
Heavy Equipment Operator / Operating Engineer  
Insulation Worker (Heat & Frost)  
Iron Worker (Assembler, Metal Buildings)  
Painter / Decorator  
Plasterer  
Plumber  
Roofer / Waterproofer  
Sheet Metal Worker  
Sprinkler Fitter  
Steamfitter (Service & Refrigeration)  
Taper & Finisher  
Telecommunications (Voice, Data & Video) Installer / Technician  
Tile Setter

## INSTRUCTIONS TO BIDDERS

**Buildings C & D Neighborhoods Remodel  
Badger Prairie Health Care Center  
1100 East Verona Ave.  
Verona, Wisconsin**

### 1. SECURING DOCUMENTS

- A. Construction Documents may be obtained at [www.countyofdane.com/pwbids](http://www.countyofdane.com/pwbids).
- B. Since Construction Documents are obtained from the Dane County web site, Bidder is responsible to check back regularly at the web site for Addenda.

### 2. BID REQUIREMENTS

- A. Bidder shall submit lump sum bid for providing all labor, equipment, tools and materials necessary to perform all Work described in Construction Documents. Only firms with capabilities, experience and expertise with similar projects should submit Bids.
- B. Envelope containing Bid shall be clearly marked as for this project (note title at top of page). Bids shall be delivered to:

Dane County Department of Public Works, Highway & Transportation  
1919 Alliant Energy Center Way  
Madison, Wisconsin 53713
- C. One (1) Bid Form shall be submitted with your Bid. Bid Form is provided with Construction Documents; no other form or letter shall be accepted.
- D. Bidders shall not add any conditions, escalator clauses or qualifying statements to Bid Form.
- E. Erasures or other changes to Bid must be explained or noted, and shall be accompanied by initials of bidder.
- F. Legally authorized official of bidder's organization shall sign Bids.
- G. Bidder's organization shall submit completed Fair Labor Practices Certification form, included in these Construction Documents.
- H. Bid Bond shall be made payable to Dane County in amount of five percent (5%) of bid amount. Bid Bond shall be either certified check or bid bond issued by surety licensed to conduct business in the State of Wisconsin. Successful bidder's Bid Bond shall be retained until Contract is signed and required Performance / Payment Bond is submitted. Bids shall be binding on bidder for one hundred-eighty (180) days after Bid Due Date. Bid Bond must be submitted with Bid.
- I. Successful bidder shall furnish and pay for Performance / Payment Bond as called for in Conditions of Contract.

### **3. INQUIRIES**

- A. Written inquiries regarding intent of Construction Documents should be directed to:

Scott Carlson, Project Manager  
Dane County Department of Public Works, Highway & Transportation  
1919 Alliant Energy Center Way, Madison, Wisconsin 53713  
Fax: 608/267-1533  
Email: carlson.scott@countyofdane.com

- B. Bidders shall bring questions, discrepancies, omissions, conflicts or doubt as to meaning of any part of Construction Documents to attention of Department of Public Works, Highway & Transportation at least ten (10) days before due date for Bids. Prompt clarification of intent of Construction Documents shall be made available to bidders in form of Addendum. Bidder shall acknowledge all Addenda on Bid Form.
- C. Failure to request clarification of interpretation of Construction Documents shall not relieve bidders of their responsibilities to perform Work.

### **4. EXAMINATION OF SITE**

- A. Coordinate site access activities with Joe Prazak, (608) 845-1225
- B. A bidders facility tour will be held on September 24, 2014 at 1:00 p.m. at Badger Prairie Health Care Center, 1100 East Verona Ave., starting in the Lobby. This tour will go approximately 1 hour. Bidders are strongly encouraged to attend this tour, however attendance is optional.

### **5. ALTERNATES**

- A. Each bidder shall carefully read requests for alternate bids. Thoroughly examine Drawings and Specifications to determine to what extent various changes and conditions affect Bids. Base Bid shall be considered void if alternate bids are not submitted in space available on Bid Form. Award of Contract shall be based on amount of lowest qualified Base Bid and additive Owner accepted alternates.
- B. Bidders shall state amount to be added or deducted from Base Bid for making changes, including all incidentals, omissions, additions, and adjustments as may be necessary of required by stated alternates.
- C. See Bid Form, Section 01 00 00 - Basic Requirements, indicated specification sections and drawings for alternates included in this project.

### **6. WITHDRAWAL OF BIDS**

- A. Any bidder may withdraw their Bid any time prior to Bid Due Date. Withdrawn Bids shall be returned unopened.

### **7. BID DUE DATE**

- A. See Legal Notice (advertisement).

**8. COMMENCEMENT AND COMPLETION OF WORK**

- A. Work shall commence by November 4, 2014.
- B. Indoor work shall be completed by January 16, 2015
- C. Outdoor work shall be completed by May 15, 2015.

**9. RESERVATION**

- A. Dane County reserves the right to reject any or all Bids, to waive any informalities in the Bid, and to accept any Bid which shall be in the best interest of Dane County.

Name of Bidding Firm: \_\_\_\_\_

**BID FORM**

**BID NO. 314001**

**PROJECT: BUILDINGS C & D NEIGHBORHOODS REMODEL  
BADGER PRAIRIE HEALTH CARE CENTER**

**TO: DANE COUNTY DEPARTMENT OF PUBLIC WORKS, HIGHWAY &  
TRANSPORTATION PROJECT MANAGER  
1919 ALLIANT ENERGY CENTER WAY  
MADISON, WISCONSIN 53713**

**BASE BID - LUMP SUM:**

The existing 16-bed neighborhood in Building D shall be subdivided to optionally allow operation as two 8-bed households. This will involve modification of doors, hardware & associated sophisticated electronic controls. The undersigned, having examined the site where the Work is to be executed and having become familiar with local conditions affecting the cost of the Work and having carefully examined the Drawings and Specifications, all other Construction Documents and Addenda thereto prepared by Dane County Department of Public Works, Highway & Transportation hereby agrees to provide all labor, materials, equipment and services necessary for the complete and satisfactory execution of the entire Work, as specified in the Construction Documents, for the Base Bid stipulated sum of:

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price

The undersigned agrees to add the alternate(s) portion of the Work as described, for the following addition(s) to or subtraction(s) from the Base Bid, as stipulated below.

**ALTERNATE BID 1 - LUMP SUM:**

Add price for providing garden patio on north side of Building D including all required interior & exterior changes.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 2 - LUMP SUM:**

Add price for providing identical changes made in Building D, to Building C, allowing controlled subdividing into two 8-bed households.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

**ALTERNATE BID 3 - LUMP SUM:**

Add price for providing garden patio on north side of Building C including all required interior & exterior changes.

\_\_\_\_\_ and \_\_\_\_\_ /100 Dollars  
Written Price

\$ \_\_\_\_\_  
Numeric Price (circle: Add or Deduct)

Receipt of the following addenda and inclusion of their provisions in this Bid is hereby acknowledged:

Addendum No(s). \_\_\_\_\_ through \_\_\_\_\_

Dated \_\_\_\_\_

Dane County Human Services - Badger Prairie Health Care Center must have the indoor work for this project completed by January 16, 2015 & the outdoor for this project completed by May 15, 2015. Assuming this Work can be started by November 4, 2014, what dates can you commence and complete this job?

Commencement Date: \_\_\_\_\_ Completion Date: \_\_\_\_\_  
(final, not substantial)

I hereby certify that all statements herein are made on behalf of:

\_\_\_\_\_  
(Name of Corporation, Partnership or Person submitting Bid)

Select one of the following:

1. A corporation organized and existing under the laws of the State of \_\_\_\_\_, or
2. A partnership consisting of \_\_\_\_\_, or
3. A person conducting business as \_\_\_\_\_;

Of the City, Village, or Town of \_\_\_\_\_ of the State of \_\_\_\_\_.

I have examined and carefully prepared this Bid from the associated Construction Documents and have checked the same in detail before submitting this Bid; that I have full authority to make such statements and submit this Bid in (its) (their) (my) behalf; and that the said statements are true and correct. In signing this Bid, we also certify that we have not, either directly or indirectly, entered into any agreement or participated in any collusion or otherwise taken any action in restraint of free competition; that no attempt has been made to induce any other person or firm to submit or not to submit a Bid; that this Bid has been independently arrived at without collusion with any other bidder, competitor, or potential competitor; that this Bid has not been knowingly disclosed prior to the Bids Due Date to another bidder or competitor; that the above statement is accurate under penalty of perjury.

The undersigned further agrees to honor the Base Bid and the Alternate Bid(s) for 180 days from date of Award of Contract.

**SIGNATURE:** \_\_\_\_\_  
(Bid is invalid without signature)

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

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

Telephone No.: \_\_\_\_\_ Fax No.: \_\_\_\_\_

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

Contact Person: \_\_\_\_\_

**THIS PAGE IS FOR BIDDERS' REFERENCE AND NEED NOT BE SUBMITTED WITH BID FORM.**

**BID CHECK LIST:**

These items **must** be included with Bid:

Bid Form

Bid Bond

Fair Labor Practices Certification

**BIDDERS SHOULD BE AWARE OF THE FOLLOWING:**

**DANE COUNTY VENDOR REGISTRATION PROGRAM**

Any person bidding on any County contract must be registered with the Dane County Purchasing Division & pay an annual registration fee. A contract will not be awarded to an unregistered vendor. Obtain a *Vendor Registration Form* by calling 608/266-4131 or complete a new form or renewal online at:

[www.danepurchasing.com/registration](http://www.danepurchasing.com/registration)

**DANE COUNTY BEST VALUE CONTRACTING PRE-QUALIFICATION**

Contractors must be pre-qualified as a Best Value Contractor with the Dane County Public Works Engineering Division before the award of contract. Obtain a *Best Value Contracting Application* by calling 608/266-4018 or complete one online at:

[www.countyofdane.com/pwht/BVC\\_Application.aspx](http://www.countyofdane.com/pwht/BVC_Application.aspx)

**EQUAL BENEFITS REQUIREMENT**

By submitting a Bid, the contractor acknowledges that a condition of this contract is to provide equal benefits as required by Dane County Code of Ordinances Chapter 25.016. Contractor shall provide equal benefits as required by that Ordinance to all required employees during the term of the contract. Equal Benefits Compliance Payment Certification shall be submitted with final pay request. For more information:

[www.danepurchasing.com/partner\\_benefit.aspx](http://www.danepurchasing.com/partner_benefit.aspx)

**FAIR LABOR PRACTICES CERTIFICATION**

The undersigned, for and on behalf of the BIDDER, APPLICANT or PROPOSER named herein, certifies as follows:

A. That he or she is an officer or duly authorized agent of the above-referenced BIDDER, APPLICANT or PROPOSER, which has a submitted a proposal, bid or application for a contract with the county of Dane.

B. That BIDDER, APPLICANT or PROPOSER has (check one):

\_\_\_\_\_ not been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

\_\_\_\_\_ been found by the National Labor Relations Board (“NLRB”) or the Wisconsin Employment Relations Commission (“WERC”) to have violated any statute or regulation regarding labor standards or relations in the seven years prior to the signature date of this Certification.

\_\_\_\_\_  
Officer or Authorized Agent Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Printed or Typed Business Name

**NOTE:** You can find information regarding the violations described above at: [www.nlr.gov](http://www.nlr.gov) and [werc.wi.gov](http://werc.wi.gov).

For reference, Dane County Ordinance 25.11(28)(a) is as follows:

(28) BIDDER RESPONSIBILITY. (a) Any bid, application or proposal for any contract with the county, including public works contracts regulated under chapter 40, shall include a certification indicating whether the bidder has been found by the National Labor Relations Board (NLRB) or the Wisconsin Employment Relations Committee (WERC) to have violated any statute or regulation regarding labor standards or relations within the last seven years. The purchasing manager shall investigate any such finding and make a recommendation to the committee, which shall determine whether the conduct resulting in the finding affects the bidder’s responsibility to perform the contract.

**If you indicated that the NLRB or WERC have found you to have such a violation, you must include copies of any relevant information regarding such violation with your proposal, bid or application.**

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**COUNTY OF DANE**

**PUBLIC WORKS CONSTRUCTION CONTRACT**

Contract No. \_\_\_\_\_ Bid No. 314001

Authority: 2014 RES - \_\_\_\_\_

**THIS CONTRACT**, made and entered into as of the date by which authorized representatives of both parties have affixed their signatures, by and between the County of Dane (hereafter referred to as "COUNTY") and \_\_\_\_\_ (hereafter, "CONTRACTOR"), and

**WITNESSETH:**

**WHEREAS**, COUNTY, whose address is c/o Assistant Public Works Director, 1919 Alliant Energy Center Way, Madison, WI 53713, desires to have CONTRACTOR provide Buildings C & D Neighborhoods Remodel, 1100 East Verona Ave, including Alternate Bids 1, 2 & 3 (if applicable) ("the Project"); and

**WHEREAS**, CONTRACTOR, whose address is \_\_\_\_\_ is able and willing to construct the Project, in accordance with the Construction Documents;

**NOW, THEREFORE**, in consideration of the above premises and the mutual covenants of the parties hereinafter set forth, the receipt and sufficiency of which is acknowledged by each party for itself, COUNTY and CONTRACTOR do agree as follows:

1. CONTRACTOR agrees to construct, for the price of \$ \_\_\_\_\_ the Project and at the CONTRACTOR'S own proper cost and expense to furnish all materials, supplies, machinery, equipment, tools, superintendence labor, insurance, and other accessories and services necessary to complete the Project in accordance with the conditions and prices stated in the Bid Form, Conditions of Contract, the drawings which include all maps, plats, plans, and other drawings and printed or written explanatory matter thereof, and the specifications therefore as prepared by Plunkett Raysich Architects, LLP (hereinafter referred to as "the Architect / Engineer"), and as enumerated in the Project Manual Table of Contents, all of which are made a part hereof and collectively evidence and constitute the Contract.
2. COUNTY agrees to pay the CONTRACTOR in current funds for the performance of the Contract subject to additions and deductions, as provided in the Conditions of Contract, and to make payments on account thereof as provided in Article entitled, "Payments to Contractor" of the Conditions of Contract.
3. During the term of this Contract, CONTRACTOR agrees to take affirmative action to ensure equal employment opportunities. The CONTRACTOR agrees in accordance with Wisconsin Statute 111.321 and Chapter 19 of the Dane County Code of Ordinances not to discriminate on the basis of age, race, ethnicity, religion, color, gender, disability, marital status, sexual orientation, national origin, cultural differences, ancestry, physical appearance, arrest record or conviction record, military participation or membership in the national guard, state defense force

or any other reserve component of the military forces of the United States, or political beliefs. Such equal opportunity shall include, but not be limited to, the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation. CONTRACTOR agrees to post in conspicuous places, available to all employees and applicants for employment, notices setting forth the provisions of this paragraph.

**4.** CONTRACTOR shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. CONTRACTOR must file such plan within fifteen (15) days of the effective date of this Contract. During the term of this Contract CONTRACTOR shall also provide copies of all announcements of employment opportunities to COUNTY'S Contract Compliance Office, and shall report annually the number of persons, by race, ethnicity, gender, and disability status, which apply for employment and, similarly classified, the number hired and number rejected.

**5.** During the term of this Contract, all solicitations for employment placed on CONTRACTOR'S behalf shall include a statement to the effect that CONTRACTOR is an "Equal Opportunity Employer."

**6.** CONTRACTOR agrees to comply with provisions of Chapter 25.016 of the Dane County Code of Ordinances, which pertains to domestic partnership benefits.

**7.** CONTRACTOR agrees to furnish all information and reports required by COUNTY'S Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provisions of this Contract.

**8.** CONTRACTOR agrees that all persons employed by CONTRACTOR or any subcontractor shall be paid no less than the minimum wage established under Chapter 40, Subchapter II, Dane County Code of Ordinances. CONTRACTOR agrees to abide by and comply with the provisions of Chapter 40, Subchapter II of the Dane County Code of Ordinances, and said Subchapter is fully incorporated herein by reference.

**9.** This Contract is intended to be a Contract solely between the parties hereto and for their benefit only. No part of this Contract shall be construed to add to, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties including, but not limited to, employees of either of the parties.

**10.** The entire agreement of the parties is contained herein and this Contract supersedes any and all oral agreements and negotiations between the parties relating to the subject matter hereof. The parties expressly agree that the express terms of this Contract shall not be amended in any fashion except in writing, executed by both parties.

**11.** CONTRACTOR must be pre-qualified as a Best Value Contractor with Dane County Public Works Engineering Division before award of Contract. Subcontractors must be pre-qualified ten (10) days prior to commencing Work under this Contract.

**IN WITNESS WHEREOF**, COUNTY and CONTRACTOR, by their respective authorized agents, have caused this Contract and its Schedules to be executed, effective as of the date by which all parties hereto have affixed their respective signatures, as indicated below.

\* \* \* \* \*

**FOR CONTRACTOR:**

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Printed or Typed Name and Title

\_\_\_\_\_  
Signature Date

\_\_\_\_\_  
Printed or Typed Name and Title

NOTE: If CONTRACTOR is a corporation, Secretary should attest. In accordance with IRS Regulations, unincorporated entities are required to provide either their Social Security or Employer Number in order to receive payment for services rendered.

\* \* \* \* \*

This Contract is not valid or effectual for any purpose until approved by the appropriate authority designated below, and no work is authorized until the CONTRACTOR has been given notice to proceed by COUNTY'S Assistant Public Works Director.

**FOR COUNTY:**

\_\_\_\_\_  
Joseph T. Parisi, County Executive Date

\_\_\_\_\_  
Scott McDonell, County Clerk Date

THE AMERICAN INSTITUTE OF ARCHITECTS



AIA Document A310

Bid Bond

Bond No.

KNOW ALL MEN BY THESE PRESENTS, that we (Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and (Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of WI as Surety, hereinafter called the Surety, are held and firmly bound unto (Here insert full name and address or legal title of Owner)

as Obligee, hereinafter called Obligee, in the sum of ( ) Percent of total amount bid Dollars (\$) Percent of attached bid.

For the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for Project No.: (Here insert full name, address, and description of project)

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee the difference not to exceed the penalty hereof between the amount specified in said bid and such larger amount for which the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this day of , 20 .

(Witness) (Principal) (Seal) (Title) (Surety) (Seal) (Witness) ATTORNEY-IN-FACT

THE AMERICAN INSTITUTE OF ARCHITECTS



Bond No. \_\_\_\_\_

AIA Document A312

Performance Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address): \_\_\_\_\_

SURETY (Name and Principal Place of Business): \_\_\_\_\_

OWNER (Name and Address): \_\_\_\_\_

CONSTRUCTION CONTRACT  
Date: \_\_\_\_\_  
Amount: \$ \_\_\_\_\_  
Description (Name and Location): \_\_\_\_\_

BOND  
Date (Not earlier than Construction Contract Date): \_\_\_\_\_  
Amount: \$ \_\_\_\_\_  
Modifications to this Bond: \_\_\_\_\_

None

See Page 3

CONTRACTOR AS PRINCIPAL  
COMPANY: \_\_\_\_\_  
(Corporate Seal)

SURETY COMPANY: \_\_\_\_\_  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:

Attorney-in-Fact

(Any additional signatures appear on page 3)

FOR INFORMATION ONLY-Name, Address and Telephone  
AGENT OR BROKER: \_\_\_\_\_

OWNER'S REPRESENTATIVE (Architect,  
Engineer or other party): \_\_\_\_\_

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Subparagraph 3.1.

3. If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

3.1 The Owner has notified the Contractor and the Surety at its address described in Paragraph 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Subparagraph 3.1; and

3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.

4. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or

4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

4.4 Waive its rights to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

1. After investigation, determine the amount for

which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefor to the Owner; or

2. Deny liability in whole or in part and notify the Owner citing reasons therefor.

5. If the Surety does not proceed as provided in Paragraph 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Subparagraph 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

6. After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Subparagraph 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

6.1 The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

6.2 Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 4; and

6.3 Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

7. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, or successors.

8. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

9. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

10. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

11. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

**12 DEFINITIONS**

12.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other

claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

12.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

12.3 Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

12.4 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

**MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:**

SAMPLE

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL  
Company: (Corporate Seal)

SURETY  
Company: (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

Signature: \_\_\_\_\_  
Name and Title:  
Address:

THE AMERICAN INSTITUTE OF ARCHITECTS



Bond No. \_\_\_\_\_

AIA Document A312

Payment Bond

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

CONTRACTOR (Name and Address):

SURETY (Name and Principal Place of Business):

OWNER (Name and Address):

CONSTRUCTION CONTRACT  
Date:  
Amount: \$  
Description (Name and Location):

BOND

Date (Not earlier than Construction Contract Date):

Amount: \$

Modifications to this Bond:

None

See Page 6

CONTRACTOR AS PRINCIPAL  
COMPANY: (Corporate Seal)

SURETY COMPANY:  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:

Signature: \_\_\_\_\_  
Name and Title:  
Attorney-in-Fact

(Any additional signatures appear on page 6)

FOR INFORMATION ONLY-Name, Address and Telephone  
AGENT OR BROKER:

OWNER'S REPRESENTATIVE (Architect,  
Engineer or other party):

1. The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.
2. With respect to the Owner, this obligation shall be null and void if the Contractor:
  - 2.1 Promptly makes payment, directly, or indirectly, for all sums due Claimants, and
  - 2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 12) of any claims, demands, liens, or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.
3. With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.
4. The Surety shall have no obligation to Claimants under this Bond until:
  - 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.
  - 4.2 Claimants who do not have a direct contract with the Contractor:
    1. Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
    2. Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
    3. Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Paragraph 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.
5. If a notice required by Paragraph 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.
6. When the Claimant has satisfied the conditions of Paragraph 4, the Surety shall promptly and at the Surety's expense take the following actions:
  - 6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.
  - 6.2 Pay or arrange for payment of any undisputed amounts.
7. The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
8. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
9. The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.
10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.
11. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Subparagraph 4.1 or Clause 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.
12. Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.
13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
14. Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor

shall promptly furnish a copy of this Bond or shall permit a copy to be made.

**15. DEFINITIONS**

**15.1 Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's

subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

**15.2 Construction Contract:** The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

**15.3 Owner Default:** Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

**MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:**

SAMPLE

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

CONTRACTOR AS PRINCIPAL  
Company: (Corporate Seal)

SURETY  
Company: (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

Signature: \_\_\_\_\_  
Name and Title:  
Address:

## EQUAL BENEFITS COMPLIANCE PAYMENT CERTIFICATION

### PURPOSE

25.016(8) of the Dane County Ordinance requires that each contractor receiving payment for contracted services must certify that he or she has complied fully with the requirements of Chapter 25.016 "Equal Benefits Requirement" of the Dane County Ordinances. Such certification must be submitted prior to the final payment on the contract.

This form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.

### CERTIFICATION

I, \_\_\_\_\_ certify that  
Printed or Typed Name and Title

\_\_\_\_\_  
Printed or Typed Name of Contractor

has complied fully with the requirements of Chapter 25.016 of the Dane County Ordinances "Equal Benefits Requirements".

Signed \_\_\_\_\_

Date \_\_\_\_\_

For questions on this form, please contact Chuck Hicklin at 608-266-4109 or your contract representative at Dane County.

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# CONDITIONS OF CONTRACT

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### 1. BIDS AND QUOTATIONS

- A. **Addressing of Bids.** Bids shall be addressed to the attention of Public Works Engineering Division and received at the Dane County Department of Public Works, Highway & Transportation, 1919 Alliant Energy Center Way, Madison, WI 53713, on or before the local time and date specified herein for the Bid Due Date. Seal all bids in envelopes and clearly mark the front with bid number and a reference to the specified contents of the bid. All uses of the term “County” in the Construction Documents shall mean Dane County.
- B. **Only One Copy Required.** Unless otherwise specified, only one copy of a bid or quotation on prescribed Bid Form will be required.
- C. **Additional Data with Bid.** Bidder may submit, on the firm’s letterhead only, additional data and information deemed advantageous to the County. The County shall hold optional the consideration of such data and information.
- D. **More than One Bid.** Bidders desiring to submit more than one bid may do so provided such additional bid or bids are properly submitted on the Dane County Department of Public Works, Highway & Transportation’s Bid Form. Obtain extra sets of Construction Documents from the Dane County Department of Public Works, Highway & Transportation. All uses of the term “Department” in the Construction Documents shall mean the Department of Public Works, Highway & Transportation, which is a unit of Dane County government.
- E. **Withdrawal or Late Bids.** The County will not accept formal bids, amendments thereto, or requests for withdrawal of a bid or any part thereof, after the time of Bid Due Date.
- F. **Preparation and Submission.** All written bids, unless otherwise provided for, must be submitted on and in accordance with forms provided by the County properly signed in ink. Bids not signed by hand are not accepted. Bidders must register in advance with the Purchasing Division.
- G. **Products by Name.** Intention of Specifications of products by name is to be descriptive of quality, workmanship, finish, function and approximate characteristics desired; intention is not necessarily restriction. Consideration of products substitution for those named is possible, provided the substitute offered is, in the opinion of the Dane County Public Works

Project Manager, equal or superior in quality, workmanship, finish, function and approximate characteristics to that specified in the Project Manual Specifications listed herein.

- H. **Visitation of Sites.** Bidder shall visit the site(s) that will receive the intended work or installation, and in so doing, be held responsible for a job deemed satisfactory by the County after completion of the Work or installation. No additional compensation shall be allowed for any condition of which bidder could have been informed.
- I. **Completeness.** Supply all information required by Construction Documents to constitute a regular bid. This shall include:
  - 1. Completed Bid Form.
  - 2. Completed Fair Labor Practices Certification.
  - 3. Completed Bid Bond.
- J. **Bids Binding One Hundred-Eighty (180) Days.** Unless otherwise specified all formal bids submitted shall be binding for one hundred-eighty (180) calendar days following Bid Due Date.
- K. **Conditional Bids.** Qualified bids are subject to complete rejection, or partial rejection.
- L. **All or Part.** Bids or quotations may be considered and award made for all or any part of total quantities as specified in the Construction Documents.
- M. **Errors.** Unit bid price shall govern when extending total prices has errors. Carelessness in quoting prices or in preparation of bid otherwise, will not relieve the bidder. Explain all erasures in bids and include signature of bidder.
- N. **Regulation by State Statutes.** The bidding and letting of contracts are subject to provisions of Wisconsin Statutes 59.52(29) and 66.0901 and all subsequent sections and amendments thereof.
- O. **Bidders Present.** The Bid Due Date is the time fixed for the opening of formal bids. The Bids' contents will be made public for the information of bidders and others properly interested, who may be present either in person or by representative. Bidders are encouraged to attend all openings, and to offer constructive suggestions for improvements to bid format or ways in which County can realize greater savings.
- P. **Taxes.** Contractor shall pay applicable State and local sales taxes.

## 2. GUARANTEE AND BOND

- A. **Bid Bond / Guarantee.** A Bid Bond shall accompany Bids, which shall be either a flat sum or a percentage figure as shown on the Project Manual Cover. This Bid Bond shall serve as a warrant that the successful bidder will fulfill the terms of the bid within the time limit as indicated in the bid after notice of award by the Dane County. The Bid Bond may be a certified bank check (note: uncertified checks will not be acceptable), a cashier's check or a United State money order payable to the order of the Treasurer of Dane County; or on a Bid Bond with corporate surety authorized to do business in the State of Wisconsin and a warranty of attorney to confess judgment thereon attached thereto. The County will return

negotiable Bid Bonds to unsuccessful bidders after awarding of bid. The County shall return a check held from a Contractor after satisfactory completion of the Contract or after receipt by the County of a Performance Bond from the Contractor, if one is required. Surety Bid Bonds will not be returned unless specifically requested by individual bidders.

- B. **Guarantor Liability.** When guarantee is required, failure of bidder to furnish an acceptable Performance Bond (Article 2.C.) within twenty (20) days after receipt of notice of award shall render the guarantor liable to the County. Bids covered by certified check or bond such security shall become the absolute property of the County and shall be deposited with the County Treasurer for the benefit of the County as liquidated damages. The County shall forthwith proceed to collect on the Bid Bond.
- C. **Performance / Payment Bond.** When required, file a guarantee that the successful bidder will faithfully perform the obligations of the bid as accepted. Such guarantee must be a bond complying with Wisconsin Statute 779.14 with corporate surety authorized to do business in this State, and that the Contractor or subcontractors will be responsible for all claims for injuries to persons or damages to property or premises arising out of or in connection with their operations prior to the acceptance of the finished work or supplies, and that they will promptly make payments to all persons supplying them with labor or materials in the execution of the Work provided for in the Contract; guarantee to indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all costs, damages and expenses growing out of or by reason of the successful bidder's failure to comply and perform the Work and complete the Contract in accordance with the Construction Documents; attach thereto a warrant of attorney authorizing the confession of judgment thereon for the benefit of the County.

### 3. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

- A. Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a subcontractor, sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.
- B. Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.
- C. Samples are physical examples that illustrate materials, equipment or workmanship and establish standards to compare the Work.
- D. Shop Drawings, Product Data, Samples and similar submittals are not Construction Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required the way the Contractor proposes to conform to the information given and the design concept expressed in the Construction Documents.
- E. The Contractor shall review, approve and submit to the Public Works Project Manager Shop Drawings, Product Data, Samples and similar submittals required by the Construction Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the County or of separate contractors. Submittals made by the Contractor not required by the Construction Documents, may be returned without action.
- F. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the Public Works Project

Manager has approved the respective submittal. Such Work shall be in accordance with approved submittals.

- G. By approving and submitting, Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Construction Documents.
- H. The Contractor shall not be relieved of responsibility for deviations from requirements of the Construction Documents by the Public Works Project Manager's approval of Shop Drawings, Product Data, Samples and similar submittals unless the Contractor has specifically informed the Public Works Project Manager in writing of such deviation at the time of submittal and the Public Works Project Manager has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Sample or similar submittals by the Public Works Project Manager's approval thereof.
- I. The Contractor shall in writing direct specific attention to revised and / or resubmitted Shop Drawings, Product Data, Samples or similar submittals that were not requested by the Architect / Engineer or the Public Works Project Manager on previous submittals.
- J. Unless specified otherwise, Contractor shall submit three (3) copies of all Shop Drawings, Product Data, Samples or similar submittals for each submission, until receiving final approval. After final approval, provide five (5) additional copies for distribution and such other copies as may be required.

#### 4. AWARDS

- A. **Lowest Responsible Bidder.** Award will be to the lowest responsible bidder conforming to Construction Documents or on the most advantageous bid to the County.
- B. **Other Considerations.** Quantities involved, time of delivery, purpose for which required, competency of bidder, the ability to render satisfactory service and past performance will be considered in determining responsibility.
- C. **Rejection of Bids.** The County reserves the right to reject any or all bids or quotations in whole or in part and to award by items, parts of items, or by any aggregate group of items specified. The County reserves also the right to waive technical defects when in its judgment the best interests of the County thereby will be served.
- D. **Notice of Acceptance.** Sufficient notification of acceptance of bid will be written notice of award to a bidder in the form of a Purchase Order or similar, mailed or delivered to the address shown on the Bid Form.
- E. **Tie Bids.** If two or more bidders submit identical bids, the decision of the County to make award to one or more of such bidders shall be final. Cash discount will be taken into consideration determining an award. Also, see Article 7.A. IDENTICAL BIDDING, Antitrust Laws.
- F. **Qualifying Bidders.** Prior to solicitation and / or awarding of bid, the County may require submission by bidder of complete financial statement and questionnaire describing bidder's

financial ability and experience in performance of similar work. Refer to Instructions to Bidders.

- G. **Disqualification.** Awards will not be made to any person, firm or company in default of a Contract with the County, or to any bidder having as its sales agent or representative or as a member of the firm, any individual previously in default or guilty of misrepresentation.
- H. **Bid Results.** Bidders may secure information pertaining to results of bids by visiting the County Purchasing Division Office Monday through Friday, between 7:45 a.m. and 4:30 p.m.

## 5. CONTRACT PROVISIONS

- A. **Acceptance Constitutes Contract.** Written acceptance by the Public Works Project Manager of a proposal for services shall constitute a Contract, which shall bind the bidder to perform the Work as detailed in the Construction Documents, for the bid amount and in accordance with all conditions of said accepted bid. A formal Contract containing all provisions of the Contract signed by both parties shall be used when required by the Public Works Project Manager.
- B. **Local Restrictions and Permits.** All work shall be done according to applicable laws, ordinances and codes. The Contractor shall procure and pay for all required permits for permanent or temporary work.
- C. **Payment of Invoices.** Payment may be made only after inspection and acceptance by the using agency and approval by the Dane County Public Works Project Manager, and, where required by ordinances, approval by the Dane County Board of Supervisors. If materials or equipment were delivered, constructed, erected, installed or tested on site, payment shall be made based on ninety-five percent (95%) of the value of all the Work performed up to fifty percent (50%) of scheduled values less the total of previous payments. Authorized extra work will be included in progress payments. Payment of balances will be made only after approval and final acceptance by the County in consideration and elimination of the possibilities of imperfect work, faulty materials or equipment, liens that have been filed, or if evidence indicates the possible filing of claims.
- D. **Contract Alterations.** No alterations or variables in the terms of a contract shall be valid or binding upon the County unless made in writing and signed by the Purchasing Agent or authorized agent.
- E. **Assignments.** No contract may be assigned, sublet or transferred without written consent of the Public Works Project Manager.
- F. **Cancellations.** A contract may be canceled or voided by the Public Works Project Manager upon non-performance or violation of contract provisions, and an award made to the next low bidder or articles specified may be purchased on the open market. In either event, the defaulting contractor (or their surety) shall be liable to Dane County for costs to the County in excess of the defaulting contractor's contract prices.
- G. **Right of the Department to Terminate Contract.**
  - 1. In the event that the Contractor or any subcontractors violate any of the provisions of this Contract, the County may serve written notice upon the Contractor and the Surety of its intention to terminate the Contract. Such notice to contain the reasons for such intention to terminate the Contract, and unless within ten (10) days after the serving of such notice

upon the Contractor, such violation or delay shall cease and satisfactory arrangement or correction be made, the Contract shall, upon the expiration of said ten (10) days, cease and terminate.

2. In the event of any such termination, the County shall immediately serve notice thereof upon the Surety and the Contractor, and the Surety shall have the right to take over and perform the Contract subject to County's approval. However, if the Surety does not commence performance thereof within ten (10) days from the date of the mailing to such Surety of notice of termination, the County may take over the Work and prosecute the same to completion by Contract or by force account for the account and at the expense of the Contractor. The Contractor and Surety shall be liable to the County for any excess cost occasioned the County thereby, and in such event the County may take possession of and utilize in completing the Work, such equipment, materials and / or supplies as may be on the site of the Work and therefore necessary.

H. **Non-Liability.** The Contractor shall not be liable in damages for delay in shipment or failure to deliver when such delay or failure is the result of fire, flood, strike, the transporting carrier, act of God, act of government, act of an alien enemy or by any other circumstances which, in the Public Works Project Manager's opinion, is beyond the control of the Contractor. Under such circumstances, however, the Public Works Project Manager may in the discretion, cancel the Contract.

I. **Quality Assurance.** Inspection of equipment, materials and / or supplies shall be made by or at the direction of the County or the Agency to which the goods are delivered, and any articles supplied that are defective, or fails in any way to meet Specifications or other requirements of the Contract, will be rejected. The Public Works Project Manager shall direct all required laboratory tests. The decision of the Public Works Project Manager on acceptance shall be final.

J. **Time for Completion.** The Contractor agrees that the Work shall be prosecuted regularly and diligently and complete the entire project as stated in the Construction Documents.

K. **Changes in the Work.**

1. Except in cases of emergency, no changes in the Work covered by the approved Construction Documents shall be made without having prior written approval of the Department. Charges or credits for the work covered by the approved change shall be determined by one of the following methods:
  - a) Unit bid prices previously approved.
  - b) An agreed lump sum based on actual cost of:
    - 1) Labor, including foremen, and all fringe benefits that are associated with their wages;
    - 2) Materials entering permanently into the Work;
    - 3) The ownership or rental cost of construction plant and equipment during the time of use on the extra work;
    - 4) Power and consumable supplies for the operation of construction or power equipment;
    - 5) Workmen's Compensation Insurance, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance;
    - 6) Social Security, pension and unemployment contributions;
    - 7) To the cost under K.1.b) 2), there shall be added a fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of the actual cost of the Work performed

- with their own labor force; the fee shall be compensation to cover the cost of supervision, overhead, bond, profit and any other general expense;
- 8) On that portion of the work under K.1.b) 2) done under subcontract, the Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit and any other general expense; and
  - 9) The Contractor shall keep and present in such form as directed, a correct amount of the cost together with such supporting vouchers as may be required by the Department.
- c) Cost-Plus Work, with a not-to-exceed dollar limit, based on actual cost of:
- 1) Labor, including foremen, and all fringe benefits that are associated with their wages;
  - 2) Materials entering permanently into the Work;
  - 3) The ownership or rental cost of construction plant and equipment during the time of use on the extra work. (Rental cost cannot exceed fifty percent (50%) replacement value of rented equipment);
  - 4) Power and consumable supplies for the operation of construction or power equipment;
  - 5) Workmen's Compensation, Contractor's Public Liability and Property Damage Insurance, and Comprehensive Automobile Liability Insurance;
  - 6) Social Security, pension and unemployment contributions;
  - 7) To the cost under K.1.c) 3) there shall be added a fixed fee to be agreed upon, but not to exceed fifteen percent (15%) of the actual cost of the Work performed with their own labor force; the fee shall be compensation to cover the cost of supervision, overhead, bond, profit, and any other general expense;
  - 8) On that portion of the work under K.1.c) 3) done under subcontract, the Contractor may include not over seven and one-half percent (7½%) for supervision, overhead, bond, profit, and any other general expense; and
  - 9) The Contractor shall keep and present in such form as directed, a correct amount of the cost together with such supporting vouchers as may be required by the Department.
2. If the Contractor claims that by any instructions given by the Architect / Engineer, the Department, by drawings or otherwise, regarding the performance of the Work or the furnishing of material under the Contract, involves extra cost, the Contractor shall give the Department written notice thereof within two weeks after the receipt of such instructions and in any event before proceeding to execute the work, unless delay in executing the work would endanger life or property.
  3. No claim for extra work or cost shall be allowed unless the same was done in pursuance of a written order of the Architect / Engineer and approved by the Department, as previously mentioned, and the claim presented with the payment request submitted after the changed or extra work is completed.
  4. Negotiation of cost for a change in the Work shall not be cause for the Contractor to delay prosecution of the Work if the Contractor has been authorized in writing by the Public Works Project Manager to proceed.

**L. Payments to Contractor.**

1. The County will make partial payments to the Contractor for the value, proportionate to the amount of the Contract, of all labor and material incorporated in the work during the preceding calendar month upon receipt of approved Application and Certificate of Payment from the Architect / Engineer and approval of the Department.

2. The Contractor shall submit to the Architect / Engineer an Application and Certificate of Payment. The Architect / Engineer will review and approve this before sending it to the Public Works Project Manager. Evidence may be required, and supplied on demand, that supports the request and the Contractor's right to the payment claimed.
3. Request for payment for preparatory work and materials delivered and suitably stored at the site to be incorporated into the Work at some future period, will be given due consideration. Requests involving materials stored off the site, may be rejected; however, if deemed essential for reasons of job progress, protection, or other sufficient cause, requests will be considered conditional upon the submission by the Contractor of bills of sale and such other procedures as will adequately protect the County's interest such as storage in a bonded warehouse with adequate coverage. If there is any error in a payment, the Contractor is obligated to notify the Department immediately, but no longer than ten (10) days from receipt of payment.
4. Payments by the County will be due within forty-five (45) days after receipt by the Department of a certified request.
5. Five percent (5%) of each request for certification will be retained until final completion and acceptance of all the Work covered by the Contract. However, anytime after fifty percent (50%) of the Work has been furnished and installed at the site, the remaining payments will be made in full if the Architect / Engineer and Public Works Project Manager find that the progress of the Work corresponds with the construction progress schedule. If the Architect / Engineer and Public Works Project Manager find that the progress of the Work does not correspond with the construction progress schedule, up to ten percent (10%) of each request for payment may be retained for the Work completed.
6. All material and work covered by partial payments made shall become the sole property of the County. This provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and work upon which payments have been made or the restoration of any damaged work, or as a waiver of the right of the County to require the fulfillment of all of the terms of the Contract.
7. Final payment will be made within sixty (60) days after final completion of the Work, and will constitute acceptance thereof. Submit Equal Benefits Compliance Payment Certification with final pay request. Payment may be denied if Certification is not included.
8. On completion and acceptance of each separate division of the Contract, on which the stated price is separated in the Contract, payment may be made in full, including retained percentages thereon, less authorized deductions.
9. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit(s) as required to prove that all debts and claims against this Work are paid in full or otherwise satisfied, and give final evidence of release of all liens against the Work and County. If Wisconsin Prevailing Wage Rate Determination is required for this Work, use "Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination" and "Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination" (if applicable). If Wisconsin Prevailing Wage Rate Determination is not required for this

Work, use “Dane County, Wisconsin Contractor Wage Affidavit”. Forms of such affidavits are included in Supplementary Conditions.

**M. Withholding of Payments.**

1. The County, after having served written notice on the said Contractor, may either pay directly any unpaid bills of which the Department has written notice, or withhold from the Contractor’s unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged. Then payment to the Contractor shall be resumed in accordance with the terms of this Contract, but in no event shall these provisions be construed to impose any obligations upon the County to either the Contractor or the Contractor’s Surety.
2. In paying any unpaid bills of the Contractor, the County shall be deemed the Agent of the Contractor, and any payment so made by the County, shall be considered as a payment made under the Contract by the County to the Contractor and the County shall not be liable to the Contractor for any such payment made in good faith.
3. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from all claims growing out of the lawful demands of subcontractors, laborers, workmen, mechanics, material men, and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the performance of this Contract.
4. At the Department’s request, the Contractor shall furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged or waived.

**N. Acceptance of Final Payment as Release.**

1. The making of final payment shall constitute a waiver of all claims by the County except those arising from:
  - a) Unsettled lien;
  - b) Faulty or defective work appearing after substantial completion;
  - c) Failure of the work to comply with the requirements of the Construction Documents;  
or
  - d) Terms of any special guarantees required by the Construction Documents.
2. The acceptance of final payment shall constitute a waiver of all claims by the Contractor.

**O. Lien Waivers.** The Contractor warrants that title to all work covered by an application for Payment will pass to the County no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all work for which Certificates for Payment have been previously issued and payments received from the County shall, to the best of the Contractor’s knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, subcontractor, material suppliers, or other persons or entities making a claim by reason of having provide labor, materials and equipment related to the Work.

**P. Use and Occupancy Prior to Acceptance.** The Contractor agrees to the use and occupancy of a portion or unit of the project before formal acceptance by the Department, provided the Department:

1. Secures written consent of the Contractor; except when in the opinion of the Department's Public Works Project Manager, the Contractor is chargeable with unwarranted delay in final cleanup of punch list items or other Contract requirements;
2. Secures endorsement from the insurance carrier and consent of the Surety permitting occupancy of the building or use of the project during the remaining period of construction, or, secures consent of the Surety;
3. Assumes all costs and maintenance of heat, electricity and water; and
4. Accepts all work completed within that portion or unit of the project to be occupied, at time of occupancy.

**Q. Correction of Work.**

1. All work, all materials whether incorporated in the Work or not, and all processes of manufacture shall at all times and places be subject to the inspection of the Architect / Engineer and the Public Works Project Manager who shall be the judge of the quality and suitability of the work, materials, and processes of manufacture for the purposes for which they are used. Should they fail to meet the Architect / Engineer's and the Public Works Project Manager's approval they shall be reconstructed, made good, replaced or corrected, as the case may be, by the Contractor at the Contractor's expense. Rejected material shall immediately be removed from the site.
2. If the Contractor defaults or neglects to carry out the Work in accordance with the Construction Documents or fails to perform any provision of the Contract, the Department may, after ten (10) days written notice to the Contractor and without prejudice to any other remedy the County may have, make good such deficiencies. In such case, an appropriate Change Order shall be issued deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including the cost of the Architect / Engineer's additional services made necessary by such default, neglect or failure.

## **6. GENERAL GUARANTEE**

**A.** Neither the final certificate of payment nor any provision in the Construction Documents nor partial or entire occupancy of the premises by the County shall constitute an acceptance of work not done in accordance with the Construction Documents or relieve the Contractor of liability in respect to any expressed warranties or responsibility for faulty materials or workmanship.

1. In no event shall the making of any payment required by the Contract constitute or be construed as a waiver by County of any breach of the covenants of the Contract or a waiver of any default of Contractor and the making of any such payment by County while any such default or breach shall exist shall in no way impair or prejudice the right of County with respect to recovery of damages or other remedy as a result of such breach or default.

**B.** The Contractor shall remedy and make good all defective workmanship and materials and pay for any damage to other work resulting therefrom, which appear within a period of one year from the date of substantial completion, providing such defects are not clearly due to abuse or misuse by the County. The Department will give notice of observed defects with reasonable promptness.

- C. Guarantee on work executed after certified date of substantial completion will begin on the date when such work is inspected and approved by the Architect / Engineer and the Public Works Project Manager.
- D. Where guarantees or warranties are required in sections of Construction Documents for periods in excess of one year, such longer terms shall apply; however, the Contractor's Performance / Payment Bond shall not apply to any guarantee or warranty period in excess of one year.

## **7. IDENTICAL BIDDING**

- A. **Antitrust Laws.** All identical bids submitted to the County because of advertised procurement for materials, supplies, equipment or services exceeding \$1,000,000.00 in total amount shall be reported to the Attorney Generals of the United States and the State of Wisconsin for possible violation and enforcement of antitrust laws.

## **8. BINDING CONTRACTS**

- A. **Contract Commitment.** Any contracts resulting from this bid shall be binding on a successful bidder(s) to its conclusion and on its assigns, heirs, executors, administrators or successors.

## **9. AFFIRMATIVE ACTION PROVISION AND MINORITY / WOMEN / DISADVANTAGED BUSINESS ENTERPRISES**

- A. **Affirmative Action Provisions.** During the term of its Contract, Contractor agrees not to discriminate on the basis of race, religion, color, sex, handicap, age, sexual preference, marital status, physical appearance, or national origin against any person, whether a recipient of services (actual or potential), an employee, or an applicant for employment. Such equal opportunity shall include but not be limited to the following: employment, upgrading, demotion, transfer, recruitment, advertising, layoff, termination, training, rates of pay, and any other form of compensation or level of service(s). Contractor agrees to post in conspicuous places, available to all employees, service recipients and applicants for this paragraph. The listing of prohibited bases for discrimination shall not be construed to amend in any fashion state or federal law setting forth additional bases and exceptions shall be permitted only to the extent allowable in state or federal law.
- B. Contractor is subject to this paragraph only if Contractor has ten (10) or more employees and receives \$10,000.00 or more in annual aggregate contracts with County. Contractor shall file an Affirmative Action Plan with the Dane County Contract Compliance Officer in accord with Chapter 19 of the Dane County Code of Ordinances. Contractor must file such plan within fifteen (15) days of the effective date of this Contract and failure to do so by that date shall constitute grounds for immediate termination of the Contract. During the term of this Contract, Contractor shall also provide copies of all announcements of employment opportunities to the County's Contract Compliance Office, and shall report annually the number of persons, by race, sex and handicap status, which apply for employment and, similarly classified, the number hired and the number rejected.
- C. Contact the Dane County Contract Compliance Officer at Dane County Contract Compliance Office, 210 Martin Luther King, Jr. Blvd., Room 421, Madison, WI 53703, 608/266-4114.

- D. In all solicitations for employment placed on Contractor's behalf during the term of this Contract, Contractor shall include a statement to the effect the Contractor is an "Equal Opportunity Employer."
- E. Contractor agrees to furnish all information and reports required by County's Contract Compliance Officer as the same relate to affirmative action and nondiscrimination, which may include any books, records, or accounts deemed appropriate to determine compliance with Chapter 19, Dane County Code of Ordinances, and the provision of this Contract.
- F. **Minority / Women / Disadvantaged / Emerging Small Business Enterprises.** Chapter 19.508 of the Dane County Code of Ordinances is the official policy of Dane County to utilize Minority Business Enterprises (MBEs), Women Business Enterprises (WBEs), Disadvantage Business Enterprises (DBEs) and Emerging Small Business Enterprises (ESBEs) fully.
- G. The Contractor may utilize MBEs / WBEs / DBEs / ESBEs as subcontractors or suppliers. A list of subcontractors will be required of the low bidder as stated in this Contract. The list shall indicate which subcontractors or suppliers are MBEs / WBEs / DBEs / ESBEs and what percentage of subcontract is awarded, shown as a percentage of the total dollar amount of the bid.

## **10. COMPLIANCE WITH FAIR LABOR STANDARDS**

- A. During term of this Contract, Contractor shall report to County Contract Compliance Officer, within ten (10) days, any allegations to, or findings by National Labor Relations Board (NLRB) or Wisconsin Employment Relations Commission (WERC) that Contractor has violated statute or regulation regarding labor standards or relations. If investigation by Contract Compliance Officer results in final determination that matter adversely affects Contractor's responsibilities under this Contract, and which recommends termination, suspension or cancellation of this Contract, County may take such action.
- B. Contractor may appeal any adverse finding by Contract Compliance Officer as set forth in Dane County Ordinance 25.015(11)(c) through (e).
- C. Contractor shall post this statement in prominent place visible to employees: "As condition of receiving and maintaining contract with Dane County, this employer shall comply with federal, state and all other applicable laws prohibiting retaliation or union organizing."

## **11. DOMESTIC PARTNERSHIP BENEFITS**

- A. Contractor agrees to provide same economic benefits to all of its employees with domestic partners as it does to employees with spouses, or cash equivalent if such benefit cannot reasonably be provided. Contractor agrees to make available for County inspection Contractor's payroll records relating to employees providing services on or under this Contract or subcontract. If any payroll records of Contractor contain any false, misleading or fraudulent information, or if Contractor fails to comply with provisions of Chapter 25.016, Dane County Ordinances, contract compliance officer may withhold payments on Contract; terminate, cancel or suspend Contract in whole or in part; or, after due process hearing, deny Contractor right to participate in bidding on future County contracts for period of one year after first violation is found and for period of three years after second or subsequent violation is found.

## 12. INSURANCE REQUIREMENTS

- A. Contractor shall indemnify, hold harmless and defend Dane County, its boards, commissions, agencies, officers, employees and representatives from and against all claims, damages, losses and expenses including attorneys' fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including the loss of use resulting there from, and is caused in whole or in part by any act or omission of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a part indemnified hereunder.
- B. In any and all claims against Dane County, its boards, commissions, agencies, officers, employees and representatives or by any employee of the Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation under this Contract shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts.
- C. The obligations of the Contractor under this Contract shall not extend to the liability of the Architect / Engineer, its agents or employees arising out of (1) the preparation or approval of maps, drawings, opinion, reports, surveys, change orders, designs or specifications; or (2) the giving of or the failure to give directions or instruction by the Architect / Engineer, its agents or employees provided such giving or failure to give is the primary cause of the injury or damage.
- D. The County shall not be liable to the Contractor for damages or delays resulting from work by third parties or by injunctions or other restraining orders obtained by third parties.
- E. **Contractor Carried Insurance.** In order to protect itself and the County, the Contractor shall not commence work under this Contract until obtaining all the required insurance and the County has approved such insurance. The Contractor shall not allow any subcontractor to commence work on the subcontract until the insurance required of the subcontractor has been so obtained and approved.
1. **Worker's Compensation Insurance**  
The Contractor shall procure and shall maintain during the life of this Contract, Worker's Compensation Insurance as required by statute for all of its employees engaged in work at the site of the project under this Contract and, in case of such work sublet, the Contractor shall require the subcontractor similarly to provide Worker's Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Worker's Compensation Insurance.
  2. **Contractor's Public Liability and Property Damage Insurance**  
The Contractor shall procure and maintain during the life of this Contract, Contractor's Public Liability Insurance and Contractor's Property Damage Insurance in an amount not less than \$1,000,000.00 per occurrence for bodily injury and death, and Contractor's Property Damage Insurance in an amount not less than \$1,000,000.00 and shall be primary with Dane County as an "Additional Insured".

3. Auto Liability Insurance

The Contractor shall procure and maintain during the life of this Contract, Comprehensive Automobile Liability Insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000.00 and shall be primary with Dane County as an "Additional Insured".

- F. Contractor either (1) shall require each subcontractors to procure and to maintain during life of subcontract, subcontractor's Public Liability Property Damage Insurance, and Comprehensive Automobile Liability Insurance of type and in same amount specified in preceding paragraphs; or (2) insure that activities of subcontractors in their own policy.
- G. Contractor shall furnish the County with certificates showing type, amount, class of operations covered, effective dates and dates of expiration of policies. Such certificates shall also contain substantially this statement: "Insurance covered by this certificate will not be canceled or materially altered, except after ten (10) days written notice has been received by the County."
- H. **Builder's Risk.** County shall provide Builder's Risk policy. Terms of this policy will be made available by County's Risk Manager upon Contractor's request. By executing this Contract, Contractor warrants it is familiar with terms of said policy.

# SUPPLEMENTARY CONDITIONS

## 1. APPLICATION & CERTIFICATE FOR PAYMENT

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit partial and final Application & Certificate for Payment for work under said contract. Form shall provide similar information as shown on AIA G702™ and G703™ forms (samples shown below). Forms shall be submitted to project Architect / Engineer for approval.


**AIA Document G702™ – 1992**

**Application and Certificate for Payment**

<b>TO OWNER:</b>	<b>PROJECT:</b>	<b>APPLICATION NO:</b>	<b>Distribution To:</b>
		<b>PERIOD TO:</b>	OWNER <input type="checkbox"/>
		<b>CONTRACT FOR:</b>	ARCHITECT <input type="checkbox"/>
<b>FROM CONTRACTOR:</b>	<b>VIA ARCHITECT:</b>	<b>CONTRACT DATE:</b>	CONTRACTOR <input type="checkbox"/>
		<b>PROJECT NOS:</b>	FIELD <input type="checkbox"/>
			OTHER <input type="checkbox"/>

**CONTRACTOR'S APPLICATION FOR PAYMENT**  
 Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM \$ \_\_\_\_\_

2. Net change by Change Orders \$ \_\_\_\_\_

3. CONTRACT SUM TO DATE (Line 1 + 2) \$ \_\_\_\_\_

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) \$ \_\_\_\_\_

5. RETAINAGE

    a. % of Completed Work (Column D + E on G703) \$ \_\_\_\_\_

    b. % of Stored Material (Column F on G703) \$ \_\_\_\_\_

    Total Retainage (Lines 5a + 5b or Total in Column I of G703) \$ \_\_\_\_\_

6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total) \$ \_\_\_\_\_

7. LESS PREVIOUS CERTIFICATE FOR PAYMENT (Line 6 from prior Certificate) \$ \_\_\_\_\_

8. CURRENT PAYMENT DUE \$ \_\_\_\_\_

9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 7 into Line 8) \$ \_\_\_\_\_

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:  
 By: \_\_\_\_\_ Date: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 State of: \_\_\_\_\_  
 County of: \_\_\_\_\_  
 Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_  
 Notary Public  
 My Commission expires: \_\_\_\_\_

**ARCHITECT'S CERTIFICATE FOR PAYMENT**  
 In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED \$ \_\_\_\_\_  
 (Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

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

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	\$	\$
Total approved this Month	\$	\$
<b>TOTALS</b>	<b>\$</b>	<b>\$</b>
<b>NET CHANGES by Change Order</b>	<b>\$</b>	

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**AIA** Document G703™ – 1992

**Continuation Sheet**

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.  
 In tabulations below, amounts are stated to the nearest dollar.  
 Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:  
 APPLICATION DATE:  
 PERIOD TO:  
 ARCHITECT'S PROJECT NO:

A LINE NO.	B DESCRIPTION OF WORK	C SCHEDULED VALUE	D WORK COMPLETED		F MATERIALS PRESENTLY STORED ON-SITE (D-OR-E)	G TOTAL COMPLETED AND STORED TO DATE (D+A-F)	H % (G ÷ C)	I BALANCE TO FINISH (C - G)	J RETAINAGE (IF VARIABLE BASE)
			D FROM PREVIOUS APPLICATION (D + E)	E THIS PERIOD					

**CAUTION:** You should sign an original AIA Contract Document, on which this list appears in RED. An original assures that changes will not be obscured.

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**2. CONTRACTOR WAGE AFFIDAVIT**

- A. Every contractor engaged in performance of any contract for Department of Public Works, Highway & Transportation shall submit to this Department, as requested and with final application for payment for work under said contract, affidavit in form as hereinafter set forth in this section. Affidavit affirms that all persons employed by contractor or by any of contractor's subcontractors on such contract have been paid no less than minimum wages established under Dane County Ordinances, Chapter 40, Subchapter II (Minimum Wage Ordinance) and in effect at date of execution of contract, that full payment of wages earned has been made, and that no rebates either directly or indirectly have been made. Form of such affidavit is included in this section.
- B. Form should be included with a copy of the final contract invoice forwarded to your contract representative at Dane County.



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1     **SECTION 01 00 00 – BASIC REQUIREMENTS**

2

3

4     **PART 1 - GENERAL**

5     1.1    SECTION SUMMARY

- 6           A.    Section Includes:
- 7                1.    Section Summary
- 8                2.    Summary of the Work
- 9                3.    Contractor Use of Premises
- 10              4.    Applications for Payment
- 11              5.    Coordination
- 12              6.    Conferences
- 13              7.    Progress Meetings
- 14              8.    Submittal Procedures
- 15              9.    Proposed Products List
- 16              10.   Shop Drawings
- 17              11.   Product Data
- 18              12.   Samples
- 19              13.   Manufacturers' Instructions
- 20              14.   Manufacturers' Certificates
- 21              15.   Quality Assurance / Quality Control of Installation
- 22              16.   References
- 23              17.   Interior Enclosures
- 24              18.   Protection of Installed Work
- 25              19.   Parking
- 26              20.   Staging Areas
- 27              21.   Occupancy During Construction and Conduct of Work
- 28              22.   Protection
- 29              23.   Progress Cleaning
- 30              24.   Products
- 31              25.   Transportation, Handling, Storage and Protection
- 32              26.   Product Options
- 33              27.   Substitutions
- 34              28.   Starting Systems
- 35              29.   Demonstration and Instructions
- 36              30.   Contract Closeout Procedures
- 37              31.   Final Cleaning
- 38              32.   Adjusting
- 39              33.   Operation and Maintenance Data
- 40              34.   Spare Parts and Maintenance Materials
- 41              35.   As-Built and Record Drawings and Specifications

42    1.2    SUMMARY OF THE WORK

- 43           A.    Project Description: Perform the Work as specified and detailed in Construction
- 44                Documents package. Contractor to provide labor & materials to remodel the existing
- 45                16-bed neighborhood in Building D to optionally allow operation as two 8-bed
- 46                households. This will involve modification of doors, hardware & associated sophisti-
- 47                cated electronic controls.
- 48           B.    Work by Owner: Not applicable.
- 49           C.    Permits: Prior to commencement of the Work, Contractor to secure any and all nec-
- 50                essary permits for completion of the Work and facility occupancy.

- 1 1.3 CONTRACTOR USE OF PREMISES
- 2 A. Limit use of premises to allow work by Contractors or Subcontractors and access by  
3 Owner.
- 4 1.4 APPLICATIONS FOR PAYMENT
- 5 A. Submit two (3) copies of each application on AIA G702™ and G703™ forms or ap-  
6 proved contractors invoice form.
- 7 B. Content and Format: Utilize Schedule of Values for listing items in Application for  
8 Payment.
- 9 C. Payment Period: Monthly.
- 10 1.5 COORDINATION
- 11 A. Coordinate scheduling, submittals, and work of various sections of Specifications to  
12 assure efficient and orderly sequence of installation of interdependent construction  
13 elements.
- 14 B. Verify utility requirement characteristics of operating equipment are compatible with  
15 building utilities.
- 16 C. Coordinate space requirements and installation of mechanical and electrical work  
17 that are indicated diagrammatically on Drawings.
- 18 1.6 CONFERENCES
- 19 A. Owner will schedule a preconstruction conference after Award of Contract for all af-  
20 fected parties.
- 21 B. When required in individual Specification section, convene a pre-installation confer-  
22 ence at project site prior to commencing work of the section.
- 23 1.7 PROGRESS MEETINGS
- 24 A. Schedule and administer meetings throughout progress of the Work at minimum of  
25 one (1) per week.
- 26 B. Preside at meetings, record minutes, and distribute copies within two (2) days to  
27 those affected by decisions made.
- 28 1.8 SUBMITTAL PROCEDURES
- 29 A. Submittal form to identify Project, Contractor, Subcontractor or supplier; and perti-  
30 nent Construction Documents references.
- 31 B. Apply Contractor's stamp, signed or initialed, certifying that review, verification of  
32 Products required, field dimensions, adjacent construction work, and coordination of  
33 information is in accordance with requirements of the Work and Construction Docu-  
34 ments.
- 35 C. Identify variations from Construction Documents and Product or system limitations  
36 that may be detrimental to successful performance of completing the Work.

- 1 D. Revise and resubmit submittals as required; identify all changes made since previ-  
2 ous submittal.
- 3 1.9 PROPOSED PRODUCTS LIST
- 4 A. Within fifteen (15) days after date of Award of Contract, submit complete list of major  
5 Products proposed for use, with name of manufacturer, trade name, and model  
6 number of each Product.
- 7 1.10 SHOP DRAWINGS
- 8 A. Submit number of copies that Contractor requires, plus two (2) copies that shall be  
9 retained by Public Works Project Manager.
- 10 1.11 PRODUCT DATA
- 11 A. Submit number of copies that Contractor requires, plus two (2) copies that shall be  
12 retained by Public Works Project Manager.
- 13 B. Mark each copy to identify applicable products, models, options, and other data.  
14 Supplement manufacturer's standard data to provide information unique to this Pro-  
15 ject.
- 16 1.12 SAMPLES
- 17 A. Submit samples to illustrate functional and aesthetic characteristics of the Product.
- 18 B. Submit samples of finishes from the full range of manufacturers' standard colors,  
19 textures, and patterns for Public Works Project Manager's selection.
- 20 1.13 MANUFACTURERS' INSTRUCTIONS
- 21 A. When specified in individual Specification sections, submit manufacturers' printed  
22 instructions for delivery, storage, assembly, installation, start-up, adjusting, and fin-  
23 ishing, in quantities specified for Product Data.
- 24 1.14 MANUFACTURERS' CERTIFICATES
- 25 A. When specified in individual Specification sections, submit manufacturers' certificate  
26 to Public Works Project Manager for review, in quantities specified for Product Data.
- 27 B. Indicate material or Product conforms to or exceeds specified requirements. Submit  
28 supporting reference data, affidavits, and certifications as appropriate.
- 29 1.15 QUALITY ASSURANCE / QUALITY CONTROL OF INSTALLATION
- 30 A. Monitor quality control over suppliers, manufacturers, Products, services, site condi-  
31 tions, and workmanship, to produce work of specified quality.
- 32 B. Comply fully with manufacturers' instructions.
- 33 C. Comply with specified standards as minimum quality for the Work except when more  
34 stringent tolerances, codes, or specified requirements indicate higher standards or  
35 more precise workmanship.

- 1 1.16 REFERENCES
- 2 A. Conform to reference standard by date of issue current as of date for receiving bids.
- 3 B. Should specified reference standard conflict with Construction Documents, request  
4 clarification from Public Works Project Manager before proceeding.
- 5 1.17 INTERIOR ENCLOSURES
- 6 A. Provide temporary partitions as required to separate work areas from Owner occu-  
7 pied areas, to prevent distribution of dust and moisture into Owner occupied areas,  
8 and to prevent damage to existing materials and equipment.
- 9 1.18 PROTECTION OF INSTALLED WORK
- 10 A. Protect installed work and provide special protection where specified in individual  
11 Specification sections.
- 12 1.19 PARKING
- 13 A. Arrange for temporary parking areas to accommodate construction personnel. Park-  
14 ing shall be available at the Work site.
- 15 1.20 STAGING AREAS
- 16 A. Coordinate staging areas with Public Works Project Manager prior to starting the  
17 Work.
- 18 B. On-site space for use as staging areas and storage of materials is limited and will be  
19 apportioned among the various Contractors as their needs dictate with due regard  
20 for storage requirements of each Contractor. Each Contractor shall be responsible  
21 for safety of equipment and materials that are stored on site.
- 22 1.21 OCCUPANCY DURING CONSTRUCTION AND CONDUCT OF WORK
- 23 A. Areas of existing facility will be occupied during period when the Work is in progress.  
24 Work may be done during normal business hours (8:00 am to 4:30 pm), but confer  
25 with Owner, schedule work and store materials so as to interfere as little as possible  
26 with normal use of premises. Notify Owner when coring or similar noise making  
27 work is to be done and obtain Owner's written approval of schedule. If schedule is  
28 not convenient for Owner, reschedule and resubmit new times for Owner approval.  
29 Coring of floor along with other noisy work may have to be done on second and third  
30 shifts.
- 31 B. Work shall be done and temporary facilities furnished so as not to interfere with ac-  
32 cess to any occupied area and so as to cause least possible interference with nor-  
33 mal operation of facility or any essential service thereof.
- 34 C. Contractor shall, at all times, provide approved, safe walkways and facility entrances  
35 for use by Owner, employees and public.
- 36 D. Contractor shall provide adequate protection for all parts of facility, its contents and  
37 occupants wherever the Work under this Contract is to be performed.
- 38 E. Each Contractor shall arrange with Owner to make necessary alterations, do new  
39 work, make connections to all utilities, etc., at such times as will not cause interrup-  
40 tion of utility services to facility. Contractor doing this work shall protect, cap, cut off

- 1 and / or replace and relocate existing pipes, electrical work and other active utilities  
2 encountered which may interfere with new construction work.
- 3 F. New work in extension of existing work shall correspond in all respects with that to  
4 which it connects or similar existing work unless otherwise indicated or specified.
- 5 1. Existing work shall be cut, altered, removed or replaced as necessary for  
6 performance of Contract obligations.
- 7 2. Work remaining in place, damaged or defaced by reason of work done un-  
8 der this Contract shall be restored equal to its condition at time of Award of  
9 Contract.
- 10 3. If removal of work exposes discolored or unfinished surfaces or work out of  
11 alignment, such surfaces shall be refinished or materials replaced as neces-  
12 sary to make continuous work uniform and harmonious.
- 13 1.22 PROTECTION
- 14 A. Contractor shall protect from injury all trees, shrubs, hedges, walks and driveways  
15 and pay for any damage to same resulting from insufficient or improper protection.
- 16 B. Guard Light: Contractor shall provide and maintain guard lights at all barricades,  
17 railings, obstructions in streets, roads or sidewalks and at all trenches adjacent to  
18 public walks or roads.
- 19 1.23 PROGRESS CLEANING
- 20 A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean  
21 and orderly condition.
- 22 1.24 PRODUCTS
- 23 A. Products: Means new material, machinery, components, equipment, fixtures, and  
24 systems forming the Work, but does not include machinery and equipment used for  
25 preparation, fabrication, conveying and erection of the Work. Products may also in-  
26 clude existing materials or components specifically identified for reuse.
- 27 B. Do not use materials and equipment removed from existing premises, except as  
28 specifically identified or allowed by Construction Documents.
- 29 1.25 TRANSPORTATION, HANDLING, STORAGE AND PROTECTION
- 30 A. Transport, handle, store and protect Products in accordance with manufacturer's in-  
31 structions.
- 32 1.26 PRODUCT OPTIONS
- 33 A. Where definite material is specified, it is not intention to discriminate against "equal"  
34 product made by another manufacturer. Intention is to set definite standard of mate-  
35 rial quality. Should bidder choose to bid materials other than those specified, bidder  
36 shall submit said materials specifications to Public Works Project Manager for ap-  
37 proval at least seven (7) days prior to Bid Due Date.
- 38 B. Products and materials that are not specified, but have been approved for use by  
39 Public Works Project Manager shall be identified in addenda to all bidding contrac-  
40 tors.

- 1 C. Requests for material or product substitutions submitted after Bid Due Date shall not  
2 be considered. Owner reserves right to approve or reject substitutions based on  
3 Specification requirements and intended use.

4 1.27 SUBSTITUTIONS

- 5 A. Public Works Project Manager shall consider requests for Substitutions only up to  
6 seven (7) days prior to date of Bid Due Date.
- 7 B. Document each request with complete data substantiating compliance of proposed  
8 Substitution with Construction Documents.
- 9 C. Submit three (3) copies of requests for Substitution for consideration. Limit each re-  
10 quest to one (1) proposed Substitution.
- 11 D. Substitutions shall not change contract price established at Bid Due Date.

12 1.28 STARTING SYSTEMS

- 13 A. Provide written notification prior to start-up of each equipment item or system.
- 14 B. Ensure that each piece of equipment or system is ready for operation.
- 15 C. Execute start-up under supervision of responsible persons in accordance with  
16 manufacturers' instructions.
- 17 D. Submit written report that equipment or system has been properly installed and is  
18 functioning correctly.

19 1.29 DEMONSTRATION AND INSTRUCTIONS

- 20 A. Demonstrate operation and maintenance of Products to Owner's personnel prior to  
21 date of final inspection.
- 22 B. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing,  
23 maintenance, and shutdown of each item of equipment at agreed-upon times, at  
24 designated location.
- 25 C. Owner may choose to videotape demonstration session; demonstration and demon-  
26 strator shall be to level of satisfaction of Owner.

27 1.30 CONTRACT CLOSEOUT PROCEDURES

- 28 A. Submit written certification that Construction Documents have been reviewed, the  
29 Work has been inspected, and the Work is complete in accordance with Construc-  
30 tion Documents and ready for Public Works Project Manager's inspection.
- 31 B. Submit final Application for Payment identifying total adjusted Contract Sum / Price,  
32 previous payments, and amount remaining due.

33 1.31 FINAL CLEANING

- 34 A. Execute final cleaning prior to final inspection.
- 35 B. Clean interior and exterior surfaces exposed to view.
- 36 C. Remove waste and surplus materials, rubbish, and construction facilities from site.

- 1 1.32 ADJUSTING
- 2 A. Adjust operating Products and equipment to ensure smooth and unhindered operation.  
3
- 4 1.33 OPERATION AND MAINTENANCE MANUAL
- 5 A. Provide operation and maintenance manual for all mechanical and electrical equipment and systems supplied and installed in the Work.  
6
- 7 1.34 SPARE PARTS AND MAINTENANCE MATERIALS
- 8 A. Provide Products, spare parts, maintenance and extra materials in quantities specified in individual Specification Sections.  
9
- 10 B. Deliver to the Work site and place in location as directed.
- 11 1.35 AS-BUILT AND RECORD DRAWINGS AND SPECIFICATIONS
- 12 A. Contractor-produced Drawings and Specifications shall remain property of Contractor whether Project for which they are made is executed or not. Contractor shall furnish Architect / Engineer with original marked up redlines of drawings and specifications that shall include all Addendums, Change Orders, Construction Bulletins, on-site changes, field corrections, etc. These are the project As-Built Drawings & Specifications.  
13  
14  
15  
16  
17
- 18 B. Architect / Engineer shall update the original Construction Documents to include all Addendums & any other changes including those provided by the Contractor in the As-Built Drawings & Specifications. These updates are the project Record Drawings & Specifications.  
19  
20  
21
- 22 C. Architect / Engineer shall furnish the Public Works Project Manager with Record Drawings as detailed in the Professional Services Agreement.  
23  
24  
25
- 26 **PART 2 – PRODUCTS** (Not Used)
- 27
- 28
- 29 **PART 3 – EXECUTION** (Not Used)
- 30
- 31
- 32 END OF SECTION

1     **SECTION 01 23 00 – ALTERNATES**

2  
3  
4     **PART 1 - GENERAL**

5  
6     RELATED DOCUMENTS

7  
8     Drawings and general provisions of Contract, including Conditions of the Contract, basic  
9     Requirements and Supplementary Conditions and other Division 00 & 01 Specification Sections,  
10     apply to this Section.

11  
12     SUMMARY

13  
14     Administrative and procedural requirements for alternates.

15  
16     DEFINITIONS

17  
18     Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in  
19     the bidding requirements that may be added to or deducted from the base bid amount if the Owner  
20     decides to accept a corresponding change either in the amount of construction to be completed or in  
21     the products, materials, equipment, systems, or installation methods described in the Contract  
22     Documents.

23  
24             The cost or credit for each alternate is the net addition to or deduction from the Contract  
25             Sum to incorporate alternate into the Work. No other adjustments are made to the Contract  
26             Sum.

27  
28     PROCEDURES

29  
30     Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of  
31     the alternate into Project.

32  
33             Include as part of each alternate, miscellaneous devices, accessory objects and similar  
34             items incidental to or required for a complete installation whether or not indicated as part of  
35             alternate.

36  
37     Notification: Immediately following award of the Contract, notify each party involved, in writing, of the  
38     status of each alternate. Indicate whether alternates have been accepted, rejected or deferred for  
39     later consideration. Include a complete description of negotiated modifications to alternates.

40  
41     Execute accepted alternates under the same conditions as other work of this Contract.

42  
43  
44     **PART 2 – PRODUCTS (Not Used)**

45  
46  
47     **PART 3 – EXECUTION**

48  
49     SCHEDULE OF ALTERNATES

50  
51  
52     Alternate No. 1:

53  
54             Base Bid: Building (or Neighborhood) 'D' Security Doors operation as indicated within the  
55             Construction Documents

56  
57             Alternate: Building 'D' Exterior Patio as indicated within the Construction Documents

- 1 Alternate No. 2:  
2  
3 Base Bid: Building 'D' Security Doors operation as indicated within the Construction  
4 Documents  
5  
6 Alternate: Building 'C' Security Doors operation as indicated within the Construction  
7 Documents and refer to details of Building 'D' to be similar at Building 'C'.  
8  
9  
10 Alternate No. 3:  
11  
12 Base Bid: Building 'D' Security Doors operation as indicated within the Construction  
13 Documents  
14  
15 Alternate: Building 'C' Exterior Patio as indicated within the Construction Documents and  
16 refer to details of Building 'D' to be similar at Building 'C'.  
17  
18  
19 END OF SECTION

1    **SECTION 01 73 29 - CUTTING AND PATCHING**

2

3

4    **PART 1 - GENERAL**

5

6    **RELATED DOCUMENTS**

7

8    Drawings and general provision of Contract, including General and Supplementary Conditions and  
9    other Division 01 Specification Sections, apply to work of this Section.

10

11   **SUMMARY**

12

13    Procedural requirements for cutting and patching.

14

15    Related sections include:

16

17            Division 31 Section "Earth Moving" for excavating and backfilling required by cutting and  
18            patching operations.

19

20   **DEFINITIONS**

21

22    Cutting: Removal of existing construction necessary to permit installation or performance of other  
23    work.

24

25    Patching: Fitting and repair work required to restore surfaces to acceptable conditions after  
26    installation of other work.

27

28   **PERFORMANCE REQUIREMENTS**

29

30    Structural Elements: Do not cut and patch structural elements in a manner that could reduce their  
31    load-carrying capacity or load-deflection ratio.

32

33    Operational Elements: Do not cut and patch operating elements and related components in a  
34    manner that results in reducing their capacity to perform as intended or that results in increased  
35    maintenance or decreased operational life or safety. Operating elements include, but are not limited  
36    to:

37

38            Primary operational systems and equipment

39

39            Air or smoke barriers

40

40            Fire-protection systems

41

41            Control systems

42

42            Communications systems

43

43            Conveying systems

44

44            Electrical wiring systems

45

46    Miscellaneous Elements: Do not cut and patch the following elements or related components in a  
47    manner that could change their load-carrying capacity, that results in reducing their capacity to  
48    perform as intended or that result in increased maintenance or decreased operational life or safety.

49

50            Water, moisture or vapor barriers

51

51            Membranes and flashings

52

52            Equipment supports

53

53            Piping, ductwork, vessels and equipment

54

54            Noise-control and vibration-control elements and systems

55

56    Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence  
57    of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied

1 spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities.  
2 Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

3  
4 Roofing  
5 Exterior Siding & Trim  
6

## 7 QUALITY ASSURANCE

8  
9 Cutting and Patching Conference: Before proceeding, meet at project site with parties involved in  
10 cutting and patching, including mechanical and electrical trades. Review areas of potential  
11 interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.  
12

## 13 WARRANTY

14  
15 Existing Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged  
16 during cutting and patching operations, by methods and with materials so as not to void existing  
17 warranties.  
18

## 19 20 PART 2 - PRODUCTS

### 21 MATERIALS

22  
23  
24 Use materials identical to in-place materials. For exposed surfaces, use materials that visually  
25 match adjacent surfaces to the fullest extent possible.  
26

27 If identical materials are unavailable or cannot be used, use materials that, when installed,  
28 will match the visual and functional performance of in-place materials.  
29

## 30 31 PART 3 – EXECUTION

### 32 PREPARATION

33  
34  
35 Temporary Support: Provide temporary support of work to be cut.  
36

37 Protection: Protect existing construction during cutting and patching to prevent damage.  
38

39 Adjoining Areas: Avoid interference with use of adjoining areas.  
40

### 41 CUTTING

42  
43 Cut existing construction using methods least likely to damage elements retained and adjoining  
44 construction.  
45

46 Use hand or small power tools designed for sawing and grinding, not hammering and  
47 chopping. Cut holes and slots as small as possible with minimum disturbance of adjacent  
48 surfaces. Temporarily cover openings when not in use.  
49

50 Existing Finishes Surfaces: Cut or drill from the exposed or finished side into concealed  
51 surfaces.  
52

53 Mechanical and Electrical Services: Unless otherwise indicated, cap, valve or plug and seal  
54 remaining portions of pipes or conduits in walls or partitions to be removed.  
55

### 56 PATCHING

- 1 Patch construction by closing up, filling, repairing, refinishing, and similar operations following per-  
2 formance of other work. Patch with seams that are durable and as invisible as possible.  
3
- 4 Inspection: Where feasible, inspect and test patched areas after completion to demonstrate  
5 integrity of installation.  
6
- 7 Exposed Finishes: Restore exposed finishes of patched areas. Extend finish restoration  
8 into retained adjoining construction in a manner that will eliminate evidence of patching and  
9 refinishing.  
10
- 11 Floors and Walls: Where removal of walls or partitions has extended one finished area into  
12 another, patch and repair floor and walls to provide even surfaces of appearance. Remove  
13 existing floor and wall coverings and replace with new materials, if necessary.  
14
- 15 Where patching occurs in a painted surface, apply primer and intermediate paint  
16 coats over the patch and apply final paint coat over entire surface containing the  
17 patch. Provide additional coats until patch blends with adjacent surfaces.  
18
- 19 Ceilings: Patch ceilings to provide an even-plane surface of uniform appearance.  
20
- 21 Building Exterior: Patch components in a manner that restores enclosure to a weathertight  
22 condition and provides thermal and water vapor control performance at least equal to  
23 original construction.  
24
- 25 CLEANING
- 26
- 27 Clean areas and spaces where cutting and patching are performed. Completely remove paint,  
28 mortar, oils, putty, and similar materials.  
29
- 30
- 31 END OF SECTION

1 **SECTION 01 74 19 – RECYCLING**

2

3

4 **PART 1 - GENERAL**

5 1.1 SECTION SUMMARY

6 A. Section Includes:

- 7 1. Waste Management Goals  
8 2. Waste Management Plan  
9 3. Reuse  
10 4. Recycling  
11 5. Materials Sorting and Storage On Site  
12 6. Lists of Recycling Facilities Processors and Haulers  
13 7. Waste Management Plan Form

14 B. Related Sections:

- 15 1. Section 01 00 00 - Basic Requirements

16 1.2 WASTE MANAGEMENT GOALS

17 A. Dane County requires that as many waste materials as possible produced as result  
18 of this project be salvaged, reused or recycled in order to minimize impact of con-  
19 struction waste on landfills and to minimize expenditure of energy and cost in fabri-  
20 cating new materials. Additional information may be found in The Dane County  
21 Green Building Policy, Resolution 299, 1999-2000.

22 B. Contractor shall develop, with assistance of Public Works Project Manager and Ar-  
23 chitect / Engineer, Waste Management Plan (WMP) for this project. Outlined in  
24 RECYCLING section of this specification are examples of materials that can be re-  
25 cycled or reused as well as recommendations for waste sorting methods.

26 1.3 WASTE MANAGEMENT PLAN

27 A. Contractor shall complete WMP and include cost of recycling / reuse in Bid. WMP  
28 will be submitted to Public Works Project Manager within fifteen (15) days of Notice  
29 to Proceed date. Copy of blank WMP form is in this Section. Submittal shall include  
30 cover letter and WMP form with:

- 31 1. Information on:  
32 a. Types of waste materials produced as result of work performed on  
33 site;  
34 b. Estimated quantities of waste produced;  
35 c. Identification of materials with potential to be recycled or reused;  
36 d. How materials will be recycled or reused;  
37 e. On-site storage and separation requirements (on site containers);  
38 f. Transportation methods; and  
39 g. Destinations.

40 1.4 REUSE

41 A. Contractors and subcontractors are encouraged to reuse as many waste materials  
42 as possible. Salvage should be investigated for materials not reusable on site.

43 1.5 RECYCLING

44 A. These materials can be recycled in Dane County area:

- 45 1. Wood.

- |    |     |  |
|----|-----|--|
| 1  | 2.  | Wood Pallets.  |
| 2  | 3.  | Fluorescent Lamps.                                   |
| 3  | 4.  | Foam Insulation & Packaging (extruded and expanded). |
| 4  | 5.  | PVC Plastic (pipe, siding, etc.).                    |
| 5  | 6.  | Asphalt & Concrete.                                  |
| 6  | 7.  | Bricks & Masonry                                     |
| 7  | 8.  | Corrugated Cardboard.                                |
| 8  | 9.  | Metal.   |
| 9  | 10. | Carpet Padding.                                      |
| 10 | 11. | Gypsum Drywall.                                      |
| 11 | 12. | Shingles.  |
| 12 | 13. | Barrels & Drums.                                     |
| 13 | 14. | Solvents.  |

14 1.6 MATERIALS SORTING AND STORAGE ON SITE

15 A. Contractor shall provide separate containers for recyclable materials. Number of  
16 containers will be dependent upon project and site conditions.

17 B. Contractor shall provide on-site locations for subcontractors supplied recycling con-  
18 tainers to help facilitate recycling.

19 1.7 LISTS OF RECYCLING FACILITIES PROCESSORS AND HAULERS

20 A. Web site [www.countyofdane.com/pwht/recycle/categories.aspx](http://www.countyofdane.com/pwht/recycle/categories.aspx) lists current infor-  
21 mation for Dane County Recycling Markets. Contractors can also contact Dane  
22 County's Special Projects & Materials Manager at 608/266-4990, or local city, vil-  
23 lage, town recycling staff listed at site  
24 [www.countyofdane.com/pwht/recycle/contacts.aspx](http://www.countyofdane.com/pwht/recycle/contacts.aspx). Statewide listings of recycling /  
25 reuse markets are available from UW Extension at  
26 [www4.uwm.edu/shwec/wrmd/search.cfm](http://www4.uwm.edu/shwec/wrmd/search.cfm).  
27

1 1.8 WASTE MANAGEMENT PLAN FORM

2 A. Contractor Information:

3 Name: \_\_\_\_\_

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

5 \_\_\_\_\_

6 Phone No.: \_\_\_\_\_ Recycling Coordinator: \_\_\_\_\_

7

MATERIAL	ESTIMATED QUANTITY	DISPOSAL METHOD (CHECK ONE)		RECYCLING / REUSE COMPANY OR DISPOSAL SITE
Salvaged & re-used building materials	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Glass	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Wood	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Wood Pallets	_____ units	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Fluorescent Lamps	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Foam Insulation	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Asphalt & Concrete	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Bricks & Masonry	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
PVC Plastic	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Corrugated Cardboard	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Metals	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Carpet Padding	_____ cu. ft. _____ lbs.	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Gypsum / Dry-wall	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	
Shingles	_____ cu. yds. _____ tons	_____ Recycled	_____ Reused	Name: _____
		_____ Landfilled	_____ Other	

Barrels & Drums	_____ units	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Solvents	_____ gallons	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____
Other	_____	_____ Recycled _____ Landfilled	_____ Reused _____ Other	Name: _____

- 1
- 2
- 3
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- 9

**PART 2 – PRODUCTS** (Not Used)

**PART 3 – EXECUTION** (Not Used)

END OF SECTION

1    **SECTION 02 41 19 - SELECTIVE STRUCTURE DEMOLITION**

2

3

4

4    **PART 1 - GENERAL**

5

6

6    RELATED DOCUMENTS

7

8

8    Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

9

10

11

11   SUMMARY

12

13

13   Demolition and removal of selected portions of building or structure.

14

14   Demolition and removal of selected site elements.

15

15   Salvage of existing items to be reused or recycled.

16

17

17   Related Sections include:

18

19

19        Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade site improvements.

20

21

22

22   DEFINITIONS

23

24

24   Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.

25

26

27

27   Remove and Salvage: Detach items from existing construction and deliver them to Owner.

28

29

29   Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

30

31

32

32   Schedule of Selective Demolition Activities: Indicate the following:

33

34

34        Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.

35

36

37

37        Interruption of utility services. Indicate how long utility services will be interrupted.

38

39

39        Locations of proposed dust and noise control temporary partitions and means of egress.

40

41

41        Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

42

43

44

44        Means of protection for items to remain and items in path of waste removal from building.

45

46

46   Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

47

48

49

49   Predemolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

50

51

52

53

53   QUALITY ASSURANCE

54

55

55   Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

56

57

1 Regulatory Requirements: Comply with governing EPA notification regulations before beginning  
2 selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

3

4 Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

5

6 Predemolition Conference: Review methods and procedures related to selective demolition  
7 including, but not limited to, the following:

8

9       Inspect and discuss condition of construction to be selectively demolished.

10

11       Review and finalize selective demolition schedule and verify availability of materials,  
12 demolition personnel, equipment, and facilities needed to make progress and avoid delays.

13

14       Review requirements of work performed by other trades that rely on substrates exposed by  
15 selective demolition operations.

16

17       Review areas where existing construction is to remain and requires protection.

18

## 19 PROJECT CONDITIONS

20

21 Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct  
22 selective demolition as Owner's operations will not be disrupted.

23

24 Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far  
25 practicable.

26

27 Notify Architect of discrepancies between existing conditions and Drawings before proceeding with  
28 selective demolition.

29

30 Hazardous Materials: If materials suspected of containing hazardous materials are encountered, do  
31 not disturb; immediately notify Architect and Owner.

32

33 Storage or sale of removed items or materials on-site is not permitted.

34

35 Utility Service: Maintain existing in-use utilities and others indicated to remain and protect them  
36 against damage during selective demolition operations.

37

38       Maintain fire-protection facilities in service during selective demolition operations.

39

## 40 WARRANTY

41

42 Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged  
43 during selective demolition, by methods and with materials so as not to void existing warranties.

44

45

## 46 PART 2 - PRODUCTS (Not Used)

47

48

## 49 PART 3 - EXECUTION

50

### 51 EXAMINATION

52

53 Verify that utilities have been disconnected and capped before starting demolition operations.

54

55 Survey existing conditions and correlate with requirements indicated to determine extent of selective  
56 demolition required.

57

1 When unanticipated mechanical, electrical, or structural elements that conflict with intended function  
2 or design are encountered, investigate and measure the nature and extent of conflict. Promptly  
3 submit a written report to Architect.

4

5 Survey of Existing Conditions: Record existing conditions by use of photographs.

6

7 Perform surveys as the Work progresses to detect hazards resulting from selective  
8 demolition activities.

9

#### 10 UTILITY SERVICES AND MECHANICAL AND ELECTRICAL SYSTEMS

11

12 Service and System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility  
13 services and mechanical and electrical systems serving areas to be selectively demolished.

14

15 Arrange to shut off indicated utilities with utility companies.

16

17 If services and systems are required to be removed, relocated, or abandoned, before  
18 proceeding with selective demolition provide temporary services and systems that bypass  
19 area of selective demolition and that maintain continuity of services and systems to other  
20 parts of building.

21

22 Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal  
23 remaining portion of pipe or conduit after bypassing.

24

#### 25 PREPARATION

26

27 Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations  
28 to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied  
29 and used facilities.

30

31 Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to  
32 people and damage to adjacent buildings and facilities to remain.

33

34 Provide protection to ensure safe passage of people around selective demolition area and to  
35 and from occupied portions of building.

36

37 Provide temporary weather protection, during interval between selective demolition of  
38 existing construction on exterior surfaces and new construction, to prevent water leakage  
39 and damage to structure and interior areas.

40

41 Protect walls, ceilings, floors, and other existing finish work that are to remain or that are  
42 exposed during selective demolition operations.

43

44 Cover and protect furniture, furnishings, and equipment that have not been removed.

45

46 Comply with requirements for temporary enclosures, dust control, heating, and cooling

47

48 Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to  
49 preserve stability and prevent movement, settlement, or collapse of construction and finishes to  
50 remain, and to prevent unexpected or uncontrolled movement or collapse of construction being  
51 demolished.

52

53 Strengthen or add new supports when required during progress of selective demolition.

54

55

56

57

58

## 1 SELECTIVE DEMOLITION

2

3 Demolish and remove existing construction only to the extent required by new construction and as  
4 indicated. Use methods required to complete the Work within limitations of governing regulations  
5 and as follows:

6

7 Proceed with selective demolition systematically, from higher to lower level. Complete  
8 selective demolition operations above each floor or tier before disturbing supporting  
9 members on the next lower level.

10

11 Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting  
12 methods least likely to damage construction to remain or adjoining construction. Use hand  
13 tools or small power tools designed for sawing or grinding, not hammering and chopping, to  
14 minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

15

16 Cut or drill from the exposed or finished side into concealed surfaces to avoid marring  
17 existing finished surfaces.

18

19 Do not use cutting torches until work area is cleared of flammable materials. At concealed  
20 spaces, such as duct and pipe interiors, verify condition and contents of hidden space before  
21 starting flame-cutting operations. Maintain portable fire-suppression devices during flame-  
22 cutting operations.

23

24 Maintain adequate ventilation when using cutting torches.

25

26 Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and  
27 promptly dispose of off-site.

28

29 Remove structural framing members and lower to ground by method suitable to avoid free  
30 fall and to prevent ground impact or dust generation.

31

32 Locate selective demolition equipment and remove debris and materials so as not to impose  
33 excessive loads on supporting walls, floors, or framing.

34

35 Dispose of demolished items and materials promptly.

36

37 Existing Items to Remain: Protect construction indicated to remain against damage and soiling  
38 during selective demolition. When permitted by Architect, items may be removed to a suitable,  
39 protected storage location during selective demolition and cleaned and reinstalled in their original  
40 locations after selective demolition operations are complete.

41

## 42 PERFORMANCE REQUIREMENTS

43

44 Regulatory Requirements: Comply with governing EPA notification regulations before beginning se-  
45 lective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

46

## 47 PROCEDURES FOR SPECIFIC MATERIALS

48

49 Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and  
50 at regular intervals, using power-driven saw, then remove concrete between saw cuts.

51

52 Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using  
53 power-driven saws, then remove masonry between saw cuts.

54

55 Components and Accessories: Remove completely, including fastening devices and installation  
56 adhesives.

57

- 1 Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in  
2 the Resilient Floor Covering Institute –Work Practices, (RFCI-WP) and its Addendum.  
3  
4 Remove residual adhesive and prepare substrate for new floor coverings by one of the  
5 methods recommended by RFCI.  
6
- 7 DISPOSAL OF DEMOLISHED MATERIALS  
8
- 9 Except for items or materials indicated to be salvaged, reinstalled, or otherwise indicated to remain  
10 Owner's property, remove demolished materials from Project site and legally dispose of them in an  
11 EPA-approved landfill.  
12
- 13 Do not allow demolished materials to accumulate on-site.  
14
- 15 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and  
16 areas.  
17
- 18 Remove debris from elevated portions of building by chute, hoist, or other device that will  
19 convey debris to grade level in a controlled descent.  
20
- 21 Do not burn demolished materials.  
22
- 23 CLEANING  
24
- 25 Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition  
26 operations. Return adjacent areas to condition existing before selective demolition operations  
27 began.  
28
- 29  
30 END OF SECTION

1    **SECTION 03 30 00 - CAST-IN-PLACE CONCRETE**

2  
3  
4    **PART 1 - GENERAL**

5  
6    **RELATED DOCUMENTS**

7  
8    Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9    and Division 01 Specification Sections, apply to this Section.

10  
11   **SUMMARY**

12  
13    Cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design,  
14    placement procedures, and finishes.

15  
16    Related Sections include:

17  
18        Division 32 Section "Concrete Paving" for concrete pavement and walks.

19  
20   **DEFINITIONS**

21  
22    Cementitious Materials: Portland cement alone or in combination with one or more of the following:  
23    blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag and  
24    silica fume.

25  
26   **SUBMITTALS**

27  
28    Product Data: For each type of product indicated.

29  
30    Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics  
31    of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

32  
33    Steel Reinforcement Shop Drawings: Detail fabrication, bending, and placement. Include bar sizes,  
34    lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices  
35    and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete  
36    reinforcement.

37  
38        Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" published in SP-66  
39        ACI Detailing Manual or MCP302-Part 3.

40  
41    Material Test Reports: For the following, from a qualified testing agency, indicating compliance with  
42    requirements:

43  
44        Aggregates. Include service record data indicating absence of deleterious expansion of  
45        concrete due to alkali aggregate reactivity.

46  
47    Material Certificates: For each of the following, signed by manufacturers:

48  
49        Cementitious materials.  
50        Steel reinforcement and accessories.

51  
52    Minutes of pre-installation conference.

53  
54   **QUALITY ASSURANCE**

55  
56    Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-  
57    certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete  
58    Flatwork Technician.

1  
2 Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products  
3 and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.  
4

5 Manufacturer certified according to NRMCA "Certification of Ready Mixed Concrete  
6 Production Facilities."  
7

8 Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and  
9 ASTM E 329 for testing indicated, as documented according to ASTM E 548.  
10

11 Source Limitations: Obtain each type or class of cementitious material of the same brand from the  
12 same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one  
13 source from a single manufacturer.  
14

15 ACI Publications: Comply with the following unless modified by requirements in the Contract  
16 Documents:  
17

18 ACI 301, "Specification for Structural Concrete," Sections 1 through 5  
19

20 ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."  
21

22 Concrete Testing Service: Engage a qualified independent testing agency to perform material  
23 evaluation tests and to design concrete mixtures.  
24

## 25 DELIVERY, STORAGE, AND HANDLING 26

27 Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and  
28 damage.  
29

30 Water stops: Store water stops under cover to protect from moisture, sunlight, dirt, oil, and other  
31 contaminants.  
32

## 33 **PART 2 - PRODUCTS** 34

### 35 FORM-FACING MATERIALS 36

37 Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and  
38 smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.  
39

40 Plywood, metal, or other approved panel materials.  
41

42 Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide  
43 lumber dressed on at least two edges and one side for tight fit.  
44

45 Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to  
46 support weight of plastic concrete and other superimposed loads.  
47

48 Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.  
49

50 Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or  
51 adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.  
52

53 Formulate form-release agent with rust inhibitor for steel form-facing materials.  
54

55 Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties  
56 designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on  
57 removal, and that will leave no corrodible metal closer than 1 inch to the plane of concrete surface.  
58

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For exposed concrete, furnish ties with tapered tie cone spreaders that, when removed, will leave holes 1-1/4 inches in diameter on concrete surface, and:

For concealed concrete, furnish ties which, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

#### STEEL REINFORCEMENT

Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

Plain-Steel Wire: ASTM A 82, as drawn.

Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

#### REINFORCEMENT ACCESSORIES

Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI "Manual of Standard Practice," of greater compressive strength than concrete.

For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

For slabs-on-grade, use chairs with plates to prevent penetration of vapor retarder.

#### CONCRETE MATERIALS

Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

Portland Cement: ASTM C 150, Type I.

Fly Ash: ASTM C 618, Class C.

Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag or Type I (SM), slag-modified portland cement.

Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded Provide aggregates from a single source.

Coarse-Aggregate: Crushed stone or gravel.

Fine Aggregate: Natural sand, free of materials with deleterious reactivity to alkali in cement.

Water: ASTM C 94/C 94M.

1  
2 ADMIXTURES

3  
4 Air-Entraining Admixture: ASTM C 260.

5  
6 Products:

7  
8 Axim Concrete Technologies; Catexol AE 260  
9 Euclid Chemical Company (The); AEA 92S  
10 Master Builders, Inc: MB AE 90 or Micro-Air  
11 W R Grace & Co; Darex II  
12 GRT Admixtures; Polychem AE or VR  
13

14 Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other  
15 admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in  
16 hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

17  
18 Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

19  
20 Products:

21  
22 Axim Concrete Technologies; Catexol 1000N  
23 Euclid Chemical Company (The); Eucon WR-91  
24 Master Builders, Inc: Polyheed 997  
25 W R Grace & Co; WRDA 82  
26 GRT Admixtures; Polychem 400 NC  
27

28 Mid Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

29  
30 Products:

31  
32 Axim Concrete Technologies; Catexol 3500N  
33 Euclid Chemical Company (The); Eucon MR  
34 Master Builders, Inc: Polyheed 997  
35 W R Grace & Co; Daracem 65  
36 GRT Admixtures; Polychem KB-1000  
37

38 Water-Reducing, Non-Chloride Accelerator: ASTM C 494/C 494M, Type C.

39  
40 Products:

41  
42 Axim Concrete Technologies; Catexol 2000RHE  
43 Euclid Chemical Company (The); Accelguard 80  
44 Master Builders, Inc: Pozzutec 20  
45 W R Grace & Co; Polarset  
46 GRT Admixtures; Super Set  
47

48 Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

49  
50 Products:

51  
52 Axim Concrete Technologies; Catexol 1000R  
53 Euclid Chemical Company (The); Eucon Retarder  
54 Master Builders, Inc: Pozzolith 100XR  
55 W R Grace & Co; Daratard 17  
56 GRT Admixtures; Polychem R  
57

58 High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F or G

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Products:

Axim Concrete Technologies; Catexol 1000SP-MN  
Euclid Chemical Company (The); Eucon 37  
Master Builders, Inc: Rheobuild 1000  
W R Grace & Co; ADVA 100 or Daracem 19  
GRT Admixtures; Polychem SPC or Melchem

CURING MATERIALS

Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

Products:

Axim Italcementi Group, Inc.; CATEXOL Cimfilm.  
ChemMasters; SprayFilm  
Conspec by Dayton Superior; Aquafilm.  
Dayton Superior Corporation; Sure Film (J-74).  
Euclid Chemical Company (The), an RPM Company; Eucobar.  
L&M Construction Chemicals, Inc.; E-CON.  
Meadows, W. R., Inc.; EVAPRE.  
Sika Corporation; SikaFilm.  
Approved substitute.

Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

Moisture-Retaining Cover: ASTM C 171, curing paper, polyethylene film or white-burlap-polyethylene sheet.

Water: Potable.

Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

Products: Subject to compliance with requirements, provide one of the following:

Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.  
ChemMasters; Safe-Cure Clear.  
Conspec by Dayton Superior; W.B. Resin Cure.  
Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).  
Euclid Chemical Co. (The), an RPM Co.; Kurez W VOX, TAMMSCURE WB 30C.  
L&M Construction Chemicals, Inc.; L&M Cure R.  
Meadows, W. R., Inc.; 1100 Clear.  
Symons by Dayton Superior; Resi-Chem Clear.  
Approved substitute

RELATED MATERIALS

Expansion and Isolation Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1 Types I and II for non-load bearing applications and Types IV and V for load bearing  
2 applications, for bonding hardened or freshly mixed concrete to hardened concrete.

3

#### 4 REPAIR MATERIALS

5

6 Cement-based, polymer-modified, self-leveling toppings product that can be applied in thicknesses  
7 from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

8

9 Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic  
10 cement as defined in ASTM C 219.

11

12 Primer: Product of underlayment manufacturer recommended for substrate,  
13 conditions, and application.

14

15 Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as  
16 recommended by underlayment manufacturer.

17

18 Repair underlayment for floor and slab areas beneath floor coverings:

19

20 Compressive Strength: Not less than 4100 psi at 28 days when tested according to  
21 ASTM C 109/C 109M.

22

23 Products: Subject to compliance with requirements, provide the basis-of-design  
24 product or a comparable product by one of the following:

25

26 Dayton Superior Corporation; "Level Topping"  
27 L&M Construction Chemicals, Inc.; Levelex HS  
28 Symons Corporation: "Concrete Top"  
29 Vexcon Chemicals Inc.; Certi-Vex SLU TC

30

31 Repair overlayment for floor or slab areas remaining exposed and not receiving floor  
32 coverings:

33

34 Compressive Strength: Not less than 5000 psi at 28 days when tested according to  
35 ASTM C 109/C 109M.

36

37 Basis-of-Design Product: Ardex SD-P.

38

39 Products: Subject to compliance with requirements, provide the basis-of-design  
40 product or a comparable product by one of the following:

41

42 Master Builders, Inc: Mastertop 112 Topping  
43 The Quikrete Companies; Quikrete Self-Leveling Floor Resurfacer Fast-  
44 Set

45

#### 46 CONCRETE MIXTURES, GENERAL

47

48 Prepare design mixtures for each type and strength of concrete, proportioned on the basis of  
49 laboratory trial mixture or field test data, or both, according to ACI 301.

50

51 Use a qualified independent testing agency for preparing and reporting proposed mixture  
52 designs based on laboratory trial mixtures. Do not use the same Agency as used for Field  
53 Quality Control Testing

54

55 Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

56

57 Admixtures: Use admixtures according to manufacturer's written instructions.

58

1 Use water-reducing or high-range water-reducing (HRWR) admixture in concrete, as  
 2 required by Concrete Mixture Schedule and as necessary for placement and workability.

3  
 4 Slump Limit for concrete containing high-range water-reducing admixture:  
 5 8"maximum  
 6

7 Use water reducing and retarding admixture when required by high temperatures, low  
 8 humidity, or other adverse placement conditions.

9  
 10 Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs  
 11 and parking structure slabs, concrete required to be watertight, and concrete with a water-  
 12 cementitious materials ratio below 0.50.

### 13 14 CONCRETE MIXTURE SCHEDULE

15 16 17 18 19 20 21 22	Class	Type of Construction	Min. Comp Strength @ 28 Days (PSI)	Slump Before addn. of HRWR (in. +/- 1 in.)	Max. Agg. Size (in.)	Min. Lbs. of Cementitious Materials per cu yd.	Air Entrainment % +/- 1½%	Notes
23	1	Footings	3000	5	1.5	470	4.5	(1)
24	2a	Exterior slab-on-grade	4500	3	0.75	564	6.0	(2)(3)(5)

### 25 26 27 28 Notes:

29  
 30 (1) Use a maximum of 50% replacement of portland cement with ground granulated blast-  
 31 furnace slag and fly ash at a 1:1 ratio, up to 350 pounds per cubic yard. If fly ash is used  
 32 alone, limit the maximum replacement to 25%.

33  
 34 (2) Use a maximum of 30% replacement of portland cement with ground granulated blast-  
 35 furnace slag and fly ash at a 1:1 ratio, up to 350 pounds per cubic yard, with a maximum  
 36 25% fly ash. If fly ash is used alone, limit the maximum replacement to 25%.

37  
 38 (3) Maximum water to cementitious materials ratio by weight: 0.45.

39  
 40 (5) High-Range, Water-Reducing Admixture may be used in mixture.

### 41 42 FABRICATING REINFORCEMENT

43  
 44 Fabricate steel reinforcement according to CRSI "Manual of Standard Practice."

### 45 46 CONCRETE MIXING

47  
 48 Provide ready-mixed concrete. Measure, batch, mix, and deliver concrete according to  
 49 ASTM C 94/C 94M, and furnish batch ticket information.

50  
 51 When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-  
 52 1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and  
 53 delivery time to 60 minutes.

### 54 55 56 PART 3 - EXECUTION

### 57 58 FORMWORK

- 1  
2 Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral,  
3 static, and dynamic loads, including construction loads that might be applied, until structure can  
4 support such loads.  
5  
6 Construct formwork so concrete members and structures are of size, shape, alignment, elevation,  
7 and position indicated, within tolerance limits of ACI 117.  
8  
9 Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:  
10  
11       Class A, 1/8 inch for smooth-formed finished surfaces.  
12  
13       Class B, 1/4 inch for rough-formed finished surfaces.  
14  
15 Construct forms tight enough to prevent loss of concrete mortar.  
16  
17 Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide  
18 crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for  
19 inclined surfaces steeper than 1.5 horizontal to 1 vertical.  
20  
21       Install keyways, reglets, recesses, and the like, for easy removal.  
22  
23       Do not use rust-stained steel form-facing material.  
24  
25 Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations  
26 and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use  
27 strike-off templates or compacting-type screeds.  
28  
29 Provide temporary openings for cleanouts and inspection ports where interior area of formwork is  
30 inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss  
31 of concrete mortar. Locate temporary openings in forms at inconspicuous locations.  
32  
33 Chamfer exterior corners and edges of permanently exposed concrete.  
34  
35 Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads  
36 required in the Work. Determine sizes and locations from trades providing such items.  
37  
38 Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and  
39 other debris just before placing concrete.  
40  
41 Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and  
42 maintain proper alignment.  
43  
44 Coat contact surfaces of forms with form-release agent, according to manufacturer's written  
45 instructions, before placing reinforcement.  
46  
47 **EMBEDDED ITEMS**  
48  
49 Place and secure anchorage devices and other embedded items required for adjoining work that is  
50 attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams,  
51 instructions, and directions furnished with items to be embedded.  
52  
53       Install anchor rods, accurately located, to elevations required and complying with tolerances  
54 in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."  
55  
56  
57  
58

1 REMOVING AND REUSING FORMS

2

3 Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support  
4 weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours  
5 after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and  
6 curing and protection operations are maintained.

7

8 Leave formwork for beam soffits, joists, slabs, and other structural elements that supports  
9 weight of concrete in place until concrete has achieved its 28-day design compressive  
10 strength.

11

12 Remove forms only if shores have been arranged to permit removal of forms without  
13 loosening or disturbing shores.

14

15 Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise  
16 damaged form-facing material is not acceptable for exposed surfaces. Apply new form-release  
17 agent.

18

19 When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align  
20 and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless  
21 approved by Architect.

22

23 STEEL REINFORCEMENT

24

25 Comply with CRSI "Manual of Standard Practice" for placing reinforcement.

26

27 Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before  
28 placing concrete.

29

30 Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would  
31 reduce bond to concrete.

32

33 Accurately position, support, and secure reinforcement against displacement. Locate and support  
34 reinforcement with bar supports to maintain minimum concrete cover.

35

36 Do not weld reinforcing bars.

37

38 Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

39

40 Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize  
41 sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of  
42 adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

43

44 JOINTS

45

46 Construct joints true to line with faces perpendicular to surface plane of concrete.

47

48 Construction Joints: Install so strength and appearance of concrete are not impaired, at locations  
49 indicated or approved by Architect.

50

51 Place joints perpendicular to main reinforcement. Continue reinforcement across  
52 construction joints, unless otherwise indicated. Do not continue reinforcement through sides  
53 of strip placements of floors and slabs.

54

55 Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete  
56 into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of  
57 concrete thickness as follows:

58

1 Exterior Slabs: Form contraction joints after initial floating by grooving and finishing each  
2 edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying  
3 surface finishes. Eliminate groover tool marks on concrete surfaces.  
4

#### 5 CONCRETE PLACEMENT

6

7 Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is  
8 complete and that required inspections have been performed.  
9

10 Do not add water to concrete during delivery at Project site or during placement, unless approved by  
11 Architect.  
12

13 Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new  
14 concrete will be placed on concrete that has hardened enough to cause seams or planes of  
15 weakness. If a section cannot be placed continuously, provide construction joints as indicated.  
16 Deposit concrete to avoid segregation.  
17

18 Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and  
19 in a manner to avoid inclined construction joints.  
20

21 Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.  
22

23 Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators  
24 vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches  
25 into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to  
26 lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate  
27 concrete and complete embedment of reinforcement and other embedded items without  
28 causing mixture constituents to segregate.  
29

30 Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete from physical  
31 damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.  
32

33 When average high and low temperature is expected to fall below 40 deg F for three  
34 successive days, maintain delivered concrete mixture temperature within the temperature  
35 range required by ACI 301.  
36

37 Do not use frozen materials or materials containing ice or snow. Do not place concrete on  
38 frozen sub-grade or on sub-grade containing frozen materials.  
39

40 Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical  
41 accelerators unless otherwise specified and approved in mixture designs.  
42

43 Hot-Weather Placement: Comply with ACI 301 and as follows:  
44

45 Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or  
46 chopped ice may be used to control temperature, provided water equivalent of ice is  
47 calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is  
48 Contractor's option.  
49

50 Fog-spray forms, steel reinforcement, and sub-grade just before placing concrete. Keep  
51 sub-grade uniformly moist without standing water, soft spots, or dry areas.  
52

#### 53 FINISHING FORMED SURFACES

54

55 Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and  
56 defects repaired and patched. Remove fins and other projections that exceed specified limits on  
57 formed-surface irregularities.  
58

1 Apply to concrete surfaces not exposed to public view.

2

### 3 FINISHING FLOORS AND SLABS

4

5 Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations  
6 for concrete surfaces. Do not wet concrete surfaces.

7

8 Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly  
9 trafficked floor surface:

10

11 Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or  
12 inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat  
13 float passes and restraightening until surface is left with a uniform, smooth, granular texture.

14

15 Float and Fine-Broom Finish: After applying float finish and while concrete is still plastic, slightly  
16 scarify surface with a fine broom.

17

18 Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or  
19 power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel  
20 marks and uniform in texture and appearance. Grind smooth any surface defects that would  
21 telegraph through applied coatings or floor coverings.

22

23 Broom Finish: Immediately after float finishing, slightly roughen surface by brooming with fiber-  
24 bristle broom perpendicular to main traffic route. Verify final finish with Architect before application.

25

26 Apply to exterior concrete platforms, and walks and elsewhere as indicated.

27

### 28 CONCRETE PROTECTING AND CURING

29

30 Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.  
31 Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during  
32 curing.

33

34 Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy  
35 conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations.  
36 Apply according to manufacturer's written instructions after placing, screeding, and bull floating or  
37 darbying concrete, but before float finishing.

38

39 Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs,  
40 and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If  
41 removing forms before end of curing period, continue curing for the remainder of the curing period.

42

43 Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces,  
44 including floors and slabs, concrete floor toppings, and other surfaces.

45

46 Cure concrete according to ACI 308.1, by one or a combination of the following methods, unless  
47 otherwise indicated:

48

49

50 Curing Compound: Apply uniformly in continuous operation by power spray or roller  
51 according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall  
52 within three hours after initial application. Maintain continuity of coating and repair damage  
53 during curing period.

54

55 Moisture cure or use moisture-retaining covers to cure the following:

56

57 Formed concrete surfaces.

58

1 CONCRETE SURFACE REPAIRS

2

3 Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and  
4 replace concrete that cannot be repaired and patched to Architect's approval.

5

6 Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and  
7 one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and  
8 placing.

9

10 Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls,  
11 air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and  
12 other discolorations that cannot be removed by cleaning.

13

14 Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2  
15 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of  
16 cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes  
17 and voids with bonding agent. Fill and compact with patching mortar before bonding agent  
18 has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with  
19 bonding agent.

20

21 Repair defects on surfaces exposed to view by blending white portland cement and standard  
22 portland cement so that, when dry, patching mortar will match surrounding color. Patch a  
23 test area at inconspicuous locations to verify mixture and color match before proceeding with  
24 patching. Compact mortar in place and strike off slightly higher than surrounding surface.

25

26 Repair defects on concealed formed surfaces that affect concrete's durability and structural  
27 performance as determined by Architect.

28

29 Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and  
30 verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces  
31 sloped to drain for trueness of slope and smoothness; use a sloped template.

32

33 Repair finished surfaces containing defects. Surface defects include spalls, pop-outs,  
34 honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate  
35 to reinforcement or completely through un-reinforced sections regardless of width, and other  
36 objectionable conditions.

37

38 After concrete has cured at least 14 days, correct high areas by grinding.

39

40 Correct localized low areas during or immediately after completing surface finishing  
41 operations by cutting out low areas and replacing with patching mortar. Finish repaired  
42 areas to blend into adjacent concrete.

43

44 Correct other low areas scheduled to receive floor coverings with a repair underlayment.  
45 Prepare, mix, and apply repair underlayment and primer according to manufacturer's written  
46 instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match  
47 adjacent floor elevations.

48

49 Correct other low areas scheduled to remain exposed with a repair topping. Cut out low  
50 areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor  
51 elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's  
52 written instructions to produce a smooth, uniform, plane, and level surface.

53

54 Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by  
55 cutting out and replacing with fresh concrete. Remove defective areas with clean, square  
56 cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen  
57 concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching  
58 concrete of same materials and mixture as original concrete except without coarse

1 aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in  
2 same manner as adjacent concrete.

3  
4 Repair random cracks and single holes 1 inch or less in diameter with patching mortar.  
5 Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose  
6 particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching  
7 mortar before bonding agent has dried. Compact patching mortar and finish to match  
8 adjacent concrete. Keep patched area continuously moist for at least 72 hours.

9  
10 Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and  
11 patching mortar.

12  
13 Repair materials and installation not specified above may be used, subject to Architect's approval.

#### 14 15 FIELD QUALITY CONTROL

16  
17 Inspections:

18  
19 Steel reinforcement placement.

20  
21 Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172  
22 shall be performed according to the following requirements:

23  
24 Testing Frequency: Obtain one composite sample for each day's pour of each concrete  
25 mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu.  
26 yd. or fraction thereof.

27  
28 When frequency of testing will provide fewer than five compressive-strength tests for  
29 each concrete mixture, testing shall be conducted from at least five randomly  
30 selected batches or from each batch if fewer than five are used.

31  
32 Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but  
33 not less than one test for each day's pour of each concrete mixture. Perform additional tests  
34 when concrete consistency appears to change.

35  
36 Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each  
37 composite sample, but not less than one test for each day's pour of each concrete mixture.

38  
39 Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40  
40 deg F and below and when 80 deg F and above, and one test for each composite sample.

41  
42 Compression Test Specimens: ASTM C 31/C 31M.

43  
44 Cast and laboratory cure two sets of two standard cylinder specimens for each  
45 composite sample.

46  
47 Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured  
48 specimens at 7 days and one set of two specimens at 28 days.

49  
50 A compressive-strength test shall be the average compressive strength from a set of  
51 two specimens obtained from same composite sample and tested at age indicated.

52  
53 When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured  
54 cylinders, Contractor shall evaluate operations and provide corrective procedures for  
55 protecting and curing in-place concrete.

56  
57 Strength of each concrete mixture will be satisfactory if every average of any three  
58 consecutive compressive-strength tests equals or exceeds specified compressive strength

1 and no compressive-strength test value falls below specified compressive strength by more  
2 than 500 psi.  
3

4 Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor  
5 within 48 hours of testing. Reports of compressive-strength tests shall contain Project  
6 identification name and number, date of concrete placement, name of concrete testing and  
7 inspecting agency, location of concrete batch in Work, design compressive strength at 28  
8 days, concrete mixture proportions and materials, compressive breaking strength, and type  
9 of break for both 7- and 28-day tests.  
10

11 Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be  
12 permitted by Architect but will not be used as sole basis for approval or rejection of concrete.  
13

14 Additional Tests: Testing and inspecting agency shall make additional tests of concrete  
15 when test results indicate that slump, air entrainment, compressive strengths, or other  
16 requirements have not been met, as directed by Architect. Testing and inspecting agency  
17 may conduct tests to determine adequacy of concrete by cored cylinders complying with  
18 ASTM C 42/C 42M or by other methods as directed by Architect.  
19

20 Additional testing and inspecting, at Contractor's expense, will be performed to  
21 determine compliance of replaced or additional work with specified requirements.  
22

23 Correct deficiencies in the Work that test reports and inspections indicate do not comply with the  
24 Construction Documents.  
25

26

27 END OF SECTION

1     **SECTION 07 92 00 - JOINT SEALANTS**

2  
3  
4     **PART 1 - GENERAL**

5  
6     **RELATED DOCUMENTS**

7  
8     Drawings and general provisions of Contract, including General and Supplementary Conditions and  
9     Division 01 Specification Sections, apply to work of this Section.

10  
11    **SUMMARY**

12  
13    Interior Joint Sealants:

14  
15        General sealant

16  
17    **SUBMITTALS**

18  
19    Product Data: For each joint-sealant product indicated.

20  
21    Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants  
22    showing the full range of colors available for each product exposed to view.

23  
24    Samples for Verification: For each type and color of joint sealant required. Install joint sealants in  
25    1/2-inch wide joints formed between two 6-inch long strips of material matching the appearance of  
26    exposed surfaces adjacent to joint sealants.

27  
28    Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate  
29    their capabilities and experience. Include lists of completed projects with project names and  
30    addresses, names and addresses of architects and owners and other information specified.

31  
32    Pre-construction Field Test Reports: Indicate which sealants and joint preparation methods resulted  
33    in optimum adhesion to joint substrates based on pre-construction testing specified in "Quality  
34    Assurance" Article.

35  
36    Field Test Report Log: For each elastomeric sealant application, include information specified in  
37    "Field Quality Control" Article.

38  
39    Warranties: Special Warranties specified in this Section.

40  
41    **QUALITY ASSURANCE**

42  
43    Manufacturer Qualifications: Provide products from Manufacturer with not less than ten (10) years in  
44    business of manufacturing the specified types of sealants.

45  
46    Installer Qualifications: Engage an Installer who has successfully completed within the last year at  
47    least 5 joint sealant applications similar in type and size to that of this project and who will assign  
48    mechanics from these earlier applications to this project, of which one will serve as lead mechanic.

49  
50    Source Limitations: Obtain each type of joint sealant through one source from a single  
51    Manufacturer.

52  
53    Pre-construction Field-Adhesion Testing: Before installing elastomeric sealants, field test their  
54    adhesion to joint substrates as follows:

55  
56        Locate test joints where indicated or, if not indicated, as directed by Architect.

57  
58        Conduct field tests for each application indicated below:

- 1  
2 Each type of elastomeric sealant and joint substrate indicated.  
3  
4 Each type of non-elastomeric sealant and joint substrate indicated.  
5  
6 Notify Architect seven (7) days in advance of dates and times when test joints will be  
7 erected. Architect to be on site during the tests.  
8  
9 Arrange for tests to take place with joint sealant manufacturer's technical representative  
10 present.  
11  
12 Test Method: Test joint sealants by hand-pull method described below:  
13  
14 Install joint sealants in 60-inch long joints using same materials and methods for  
15 joint preparation and joint-sealant installation required for the completed work. Allow  
16 sealants to cure fully before testing.  
17  
18 Make knife cut from one side of joint to the other, followed by two cuts approximately  
19 2-inch long at sides of joint and meeting cross cut at one end. Place a mark 1-inch  
20 from crosscut end of 2-inch piece.  
21  
22 Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark;  
23 pull firmly at a 90 degree angle or more in direction of side cuts while holding a ruler  
24 along side of sealant. Pull sealant out of joint to the distance recommended by  
25 sealant manufacturer for testing adhesive capability, but not less than that equaling  
26 specified maximum movement capability in extension; hold this position for 10  
27 seconds.  
28  
29 For joints with dissimilar substrates, check adhesion to each substrate separately.  
30 Do this by extending cut along one side, checking adhesion to opposite side, and  
31 then repeating this procedure for opposite side.  
32  
33 Report whether sealant in joint connected to pulled-out portion failed to adhere to joint  
34 substrates or tore cohesively. Include data on pull distance used to test each type of product  
35 and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is  
36 obtained.  
37  
38 Preinstallation Meeting: At Contractor's directions, Installer, joint sealer Manufacturers'  
39 representatives and other trades whose work affects installation of joint sealers shall meet at project  
40 site to review procedures and time schedule proposed for installation of joint sealers to be  
41 coordinated with other related work.  
42  
43 DELIVERY, STORAGE AND HANDLING  
44  
45 Deliver materials to project site in original unopened containers or bundles with labels informing  
46 about manufacturer, product name and designation, color, expiration period for use, pot life, curing  
47 time and mixing instructions for multi-component materials.  
48  
49 Store and handle materials to prevent their deterioration or damage due to moisture, temperature  
50 change, contaminants or other causes. Comply with manufacturer's recommendations.  
51  
52 PROJECT CONDITIONS  
53  
54 Environmental Conditions: Do not proceed with installation of joint sealants under the following  
55 conditions:  
56

1 When adverse or inclement weather conditions are impending or when ambient and  
2 substrate temperature conditions are outside the limits permitted by joint sealant  
3 manufacturers.

4  
5 When joint substrates are wet due to rain, frost, condensation or other causes.  
6

7 Joint Width Conditions: Do not proceed with installation of joint sealants when joint widths are less  
8 than recommended by joint sealant manufacturer for application indicated.

9  
10 **WARRANTY**

11  
12 Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace  
13 elastomeric joint sealants that do not comply with performance and other requirements specified in  
14 this Section within specified warranty period.

15  
16 Warranty Period: Five (5) years from date of Substantial Completion.

17  
18 Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant Manufacturer,  
19 agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with  
20 performance and other requirements specified in this Section within specified warranty period.

21  
22 Warranty Period:

23  
24 Silicone Sealants: (20) years from date of Substantial Completion.

25  
26 Sealants other than Silicone: (10) years from date of Substantial Completion.

27  
28  
29 **PART 2 - PRODUCTS**

30  
31 **PERFORMANCE REQUIREMENTS**

32  
33 Provide joint sealants that establish and maintain watertight and airtight continuous joint seals  
34 without staining or deteriorating joint substrates.

35  
36 **SEALANTS, GENERAL**

37  
38 Compatibility: Provide joint sealants, joint fillers and other related materials that are compatible with  
39 one another and with joint substrates under conditions of service and application, as demonstrated  
40 by testing and field experience.

41  
42 Colors: Provide colors of exposed joint sealants or as selected by Architect from Manufacturer's  
43 standard range,  
44

45 **INTERIOR SEALANTS**

46  
47 General Sealant: One-part, siliconized acrylic latex sealant, ASTM C 834, paintable.

48  
49 Application: Door and window frame perimeters

50  
51 Products Pecora AC-20 Latex Sealant  
52 Tremco Tremflex #834 Siliconized Acrylic Latex Sealant  
53

54 Mildew Resistant Sealant: One-part silicone sealant, ASTM C 920, Type S, Grade NS, Class 25,  
55 Use NT, G, A, O, FDA approved with an NSF rating of C2.

56  
57 Application: Sealing joints in non-porous building surfaces such as ceramic tile (except  
58 floors), joints around plumbing fixtures and countertops containing sinks.

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Products: Dow Corning #786 Mildew Resistant Silicone Sealant  
Pecora #898 Silicone Sanitary Sealant

#### JOINT SEALANT BACKING

Provide sealant backings that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

Backer Rod: ASTM C 1330 cylindrical sealant backings of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

#### MISCELLANEOUS MATERIALS

Primers: Types recommended by joint sealant manufacturers where required for adhesion of sealant to joint substrates, as determined from pre-construction joint sealant substrate and field tests.

Provide primer in accordance with Manufacturer's instructions, being applied prior to the installation of backer rod or bond breaker tape. Consult manufacturer for surfaces not specifically covered in submittal application instructions. If a stain type primer is used, apply material in a manner that will prevent exposed stain residue related to application procedures.

Cleaners for Nonporous Surfaces: Non-staining, chemical cleaner of type acceptable to manufacturer of sealant and sealant backing materials that are not harmful to substrates and adjacent nonporous materials.

Masking Tape: Non-staining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

### **PART 3 - EXECUTION**

#### EXAMINATION

Examine joints indicated to receive joint sealants for compliance with requirements for joint configurations, installation tolerances and other conditions affecting joint sealant performance. Submit written report listing any conditions detrimental to performance of joint sealant work. Do not allow joint sealant work to proceed until unsatisfactory conditions have been corrected. Start of installation is evidence of acceptance of substrate.

#### PREPARATION

Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturers.

Remove all foreign material from joint substrates which could interfere with adhesion of joint sealant, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; oil; grease; waterproofing; water repellents; water; surface dirt and frost.

Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, acid washing

1 or a combination of these methods to produce a clean, sound substrate capable of  
2 developing optimum bond with joint sealants. Remove loose particles remaining from above  
3 cleaning operations by vacuuming or blowing out joints with oil free compressed air.

4  
5 Remove laitance and form release agents from concrete.

6  
7 Clean metal, glass, porcelain-enamel, glazed surfaces of ceramic tile and other non-porous  
8 surfaces by chemical cleaners or other means that are not harmful to substrates or leave  
9 residues capable of interfering with adhesion of joint sealants.

10  
11 Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer based on  
12 pre-construction tests or prior experience. Confine primers to areas of joint sealant bond; do not  
13 allow spillage or migration onto adjoining surfaces.

14  
15 Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining  
16 surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning  
17 methods required to remove sealant smears. Remove tape immediately after tooling without  
18 disturbing joint seal.

19  
20 INSTALLATION

21  
22 Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint  
23 sealants as applicable to materials, applications, and conditions indicated.

24  
25 Installation of Sealant Backings: Install sealant backings to support sealants during application at  
26 position required to produce cross-sectional shapes and depths of installed sealants relative to joint  
27 widths that allow optimum sealant movement capability.

28  
29 Do not leave gaps between ends of sealant backings.

30  
31 Do not stretch, twist, puncture, or tear sealant backings.

32  
33 Remove absorbent sealant backings that have become wet before sealant  
34 application and replace them with dry materials.

35  
36 Install bond-breaker tape behind sealants where backer rod is not used between sealants  
37 and backs of joints.

38  
39 Installation of Sealants: Prepare, mix and install sealants by proven techniques that result in  
40 sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for  
41 each joint configuration and providing uniform, cross sectional shapes and depths relative to joint  
42 widths which allow optimum sealant movement capability. Comply strictly with manufacturer's  
43 recommendations. Prevent three-sided adhesion. Sealant depth shall be one half of joint width, with  
44 a minimum depth of 1/4-inch and a maximum depth of 1/2-inch, unless otherwise recommended by  
45 the manufacturer. Width of sealant shall not be less than 1/4-inch.

46  
47 Tooling of Non-sag Sealants: Immediately after sealant application and prior to time skinning or  
48 curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air  
49 pockets and to insure contact and adhesion of sealant with sides of joint. Remove excess sealants  
50 from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces  
51 or are not approved by sealant manufacturer.

52  
53 Joint Configuration: Figure 6A in ASTM C 962, unless otherwise indicated.

54  
55 FIELD QUALITY CONTROL

56  
57 Test adhesion of joint sealants according to "Test Method" in Part 1 Article "Pre-construction Field-  
58 Adhesion Testing."

- 1  
2 Inspect joints for complete fill, for absence of voids and for joint configuration complying with  
3 specified requirements.  
4
- 5 Extent of Testing: (Architect to receive/witness verification from the field)  
6
- 7 Perform 10 tests for the first 1000 feet of joint length for each type of exterior sealant and  
8 joint substrate.  
9
- 10 Perform one test for each 1000 feet of joint length thereafter or one test per each floor per  
11 elevation.  
12
- 13 Inspect tested joints and report on the following:  
14
- 15 Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates  
16 or tore cohesively. Include data on pull distance used to test each type of product and joint  
17 substrate. Compare these results if adhesion passes sealant manufacturer's field-adhesion  
18 hand-pull test criteria.  
19
- 20 Whether sealants filled joint cavities and are free from voids.  
21
- 22 Whether sealant dimensions and configurations comply with specified requirements.  
23
- 24 Record test results in a field adhesion test log. Include dates when sealants were installed, names  
25 of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion  
26 results and percent elongations, sealant fill, sealant configuration and sealant dimensions.  
27
- 28 Repair sealants pulled from test area by applying new sealants following same procedures used to  
29 originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts  
30 original sealant.  
31
- 32 Evaluation of Field-Test Results: Sealants not evidencing adhesive failure from testing or  
33 noncompliance with other indicated requirements will be considered satisfactory. Remove sealants  
34 that fail to adhere to joint substrates during testing or to comply with other requirements. Retest  
35 failed applications until test results prove sealants comply with indicated requirements.  
36
- 37 **CLEANING**  
38
- 39 Clean off excess sealants or sealant smears adjacent to joints as the work progresses by methods  
40 and with cleaning materials approved in writing by Manufacturer of joint sealants and of products in  
41 which joints occur.  
42
- 43 **PROTECTION**  
44
- 45 Protect joint sealants during and after curing period from contact with contaminating substances and  
46 from damage resulting from construction operations or other causes so sealants are without  
47 deterioration or damage at time of Substantial Completion. If, despite such protection, damage or  
48 deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so  
49 installations with repaired areas are indistinguishable from the original work.  
50
- 51  
52 **END OF SECTION**

1     **SECTION 08 41 13 – ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS**

2  
3  
4     **PART 1 - GENERAL**

5  
6     **RELATED DOCUMENTS**

7  
8     Drawings and general provisions of the Contract, including Construction Documents and  
9     Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this Section.

10  
11    **SUMMARY**

12  
13    Aluminum storefront framing  
14    Manual-swing aluminum-framed entrance doors

15  
16    Related requirements include:

17  
18        Door Schedule on Drawing 800 for location, size, design and hardware requirements for  
19        entrance doors.

20        Section 07 92 00 "Joint Sealants" for perimeter sealing of framing

21        Section 08 71 00 "Door Hardware" for hardware required for aluminum-framed entrances.

22  
23    **ACTION SUBMITTALS**

24  
25    Product Data: For each type of product indicated. Include construction details, material  
26    descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed  
27    systems.

28  
29    Shop Drawings: For fabrication and installation of entrances and storefronts. Include plans,  
30    elevations, sections, details, attachments to other work, and the following:

31  
32        Details of provisions for system expansion and contraction and for drainage of moisture in  
33        the system to the exterior.

34  
35        Details of interface with air and vapor barriers in adjacent construction

36  
37        Details of preparation for hardware, including reference to Hardware Groups and provisions  
38        for electrified door hardware and controls.

39  
40    Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

41  
42    **INFORMATIONAL SUBMITTALS**

43  
44    Qualification Data: For qualified installer

45  
46    Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and  
47    components, from manufacturer.

48  
49        Basis for Certification: NFRC-certified energy performance values for each aluminum-  
50        framed entrance and storefront.

51  
52    Field quality-control reports.

53  
54    Warranties: Sample of special warranties.

55  
56    **CLOSEOUT SUBMITTALS**

57  
58    Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

1

2 Warranties: Special warranties.

3

#### 4 QUALITY ASSURANCE

5

6 Installer Qualifications: Manufacturer's authorized representative who is trained and approved for  
7 installation of units required for this Project.

8

9 Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings,  
10 based on testing and engineering analysis of manufacturer's standard units in systems similar to  
11 those indicated for this Project.

12

13 Source Limitations: Obtain each type of aluminum-framed system from single source from single  
14 manufacturer.

15

16 Preinstallation Conference: Conduct conference at Project site.

17

#### 18 PROJECT CONDITIONS

19

20 Field Measurements: Verify actual locations of structural supports and dimensions of openings for  
21 aluminum-framed systems by field measurements before fabrication and indicate measurements on  
22 Shop Drawings.

23

#### 24 WARRANTY

25

26 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace  
27 components of aluminum-framed systems that do not comply with requirements or that fail in  
28 materials or workmanship within specified warranty period.

29

30 Failures include, but are not limited to, the following:

31

32 Structural failures including, but not limited to, excessive deflection.

33

34 Noise or vibration caused by thermal movements.

35

36 Deterioration of metals, metal finishes and other materials beyond normal  
37 weathering.

38

39 Water leakage through fixed glazing and framing areas.

40

41 Warranty Period: 5 years from date of Substantial Completion.

42

43

## 44 PART 2 - PRODUCTS

45

### 46 MANUFACTURERS

47

48 Provide comparable products by one of the following:

49

50 EFCO Corporation

51

51 Kawneer North America

52

52 Pittco Architectural Metals, Inc.

53

53 Trulite Glass & Aluminum Solutions

54

54 Tubelite, Inc.

55

55 United States Aluminum

56

56 YKK AP America, Inc.

57

58

1 PERFORMANCE REQUIREMENTS

2

3 Aluminum-framed systems shall withstand the effects of the following performance requirements  
4 without exceeding performance criteria or failure due to defective manufacture, fabrication,  
5 installation, or other defects in construction.

6

7 Movements of supporting structure indicated on Drawings including, but not limited to  
8 deflection from uniformly distributed and concentrated live loads.

9

10 Dimensional tolerances of building frame and other adjacent construction.

11

12 Failure includes the following:

13

14 Deflection exceeding specified limits.

15

16 Thermal stresses transferring to building structure.

17

18 Framing members transferring stresses, including those caused by thermal and  
19 structural movements to glazing.

20

21 Noise or vibration created by wind and by thermal and structural movements.

22

23 Loosening or weakening of fasteners, attachments, and other components.

24

25 Sealant failure.

26

27 Deflection of Framing Members:

28

29 Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to  
30 glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or  
31 an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is  
32 less.

33

34 Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is  
35 smaller.

36

37 Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330  
38 as follows:

39

40 When tested at positive and negative wind-load design pressures, systems do not evidence  
41 deflection exceeding specified limits.

42

43 When tested at 150 percent of positive and negative wind-load design pressures, systems,  
44 including anchorage, do not show evidence of material failures, structural distress, and  
45 permanent deformation of main framing members exceeding 0.2 percent of span.

46

47 Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

48

49 Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing  
50 and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a  
51 minimum static-air-pressure difference of 6.24 lbf/sq. ft.

52

53 Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence  
54 water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at  
55 a minimum static-air-pressure difference of 8.00 lbf/sq. ft.

56

57 Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas  
58 having a frame condensation-resistance factor (CRF) of not less than 62 when glazed with 1 inch

1 low-e coated, argon-filled, clear insulating glass with warm edge spacers and tested according to  
2 AAMA 1503.

3

4 Provide thermal entrance doors having a frame condensation-resistance factor (CRF) of not  
5 less than 56.

6

7 Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas  
8 having an average U-factor of not more than 0.44 Btu/sq. ft. x h x deg when tested according to  
9 AAMA 1503 when glazed with 1 inch low-e coated, argon-filled clear insulating glass with warm edge  
10 spacers.

11

12

13 Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation  
14 Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

15

#### 16 MATERIALS

17

18 Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

19

20 Sheet and Plate: ASTM B 209.

21

22 Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.

23

24 Extruded Structural Pipe and Tubes: ASTM B 429.

25

26 Structural Profiles: ASTM B 308/B 308M.

27

#### 28 ENTRANCE DOOR SYSTEMS

29

30 Manufacturer's standard glazed entrance doors for manual-swing operation.

31

32 Standard Entrance Doors:

33

34 Basis of Design: 500 Wide Stile Kawneer

35

36 Door Construction: 1-3/4 inch overall thickness, with minimum 0.125 inch thick, extruded  
37 aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing  
38 brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

39

40 Door Design: 5 inch nominal width stiles and top rail, 10 inch bottom rail.

41

42 Glazing Stops and Gaskets: Beveled, snap-on, extruded-aluminum stops and preformed  
43 gaskets.

44

45 Provide non-removable glazing stops on outside of door.

46

#### 47 GLAZING SYSTEMS

48

49 Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of  
50 profile and hardness required to maintain watertight seal.

51

52 Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

53

#### 54 ACCESSORIES

55

56 Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining,  
57 nonferrous shims for aligning system components.

58

- 1 Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding  
2 fasteners and accessories compatible with adjacent materials.  
3
- 4 Use self-locking devices where fasteners are subject to loosening or turning out from thermal  
5 and structural movements, wind loads, or vibration.  
6
- 7 Reinforce aluminum members less than 0.125 inch thick to receive fastener threads or  
8 provide standard non-corrosive pressed-in splined grommet nuts.  
9
- 10 Use exposed fasteners with countersunk Phillips screw heads, finished to match framing  
11 system.  
12
- 13 Foam Insulation: Minimal-expansion closed-cell insulating polyurethane foam sealant.  
14
- 15 Products:  
16
- 17 Great Stuff; Dow Chemical Company  
18 Handi Foam, Fomo Products, Inc.  
19
- 20 Weather Stripping: Manufacturer's standard replaceable components.  
21
- 22 Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded  
23 PVC.  
24
- 25 Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric  
26 or aluminum-strip backing.  
27
- 28 Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on  
29 mounting strip.  
30
- 31 Silencers: BHMA A156.16, Grade 1.  
32
- 33 Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with  
34 maximum height of 1/2 inch. Provide thermally broken thresholds for thermal entrances.  
35
- 36 Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements  
37 except containing no asbestos; formulated for 30-mil thickness per coat.  
38
- 39 FABRICATION  
40
- 41 Form or extrude aluminum shapes before finishing.  
42
- 43 Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of  
44 finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.  
45
- 46 Framing Members, General: Fabricate components that, when assembled, have the following  
47 characteristics:  
48
- 49 Profiles which are sharp, straight and free of defects or deformations.  
50
- 51 Accurately fitted joints with ends coped or mitered.  
52
- 53 Means to drain water passing joints, condensation within framing members, and moisture  
54 migrating within the system to exterior.  
55
- 56 Physical and thermal isolation of glazing from framing members.  
57

- 1 Accommodations for thermal and mechanical movements of glazing and framing to maintain  
2 required glazing edge clearances.  
3  
4 Provisions for field replacement of glazing from exterior.  
5  
6 Fasteners, anchors, and connection devices that are concealed from view to greatest extent  
7 possible.  
8  
9 Flush glazed without projecting stops.  
10  
11 Sill Starters: Provide weep holes in front face of sill starter at center of each lite. Provide air baffles  
12 at back of weeps. Shop install end dams.  
13  
14 Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for  
15 installing entrance door hardware.  
16  
17 At exterior doors, provide thermally broken frames with compression weather stripping at  
18 fixed stops.  
19  
20 At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three  
21 silencers on strike jamb of single-door frames and two silencers on head of frames for pairs  
22 of doors.  
23  
24 Entrance Doors: Reinforce doors as required for installing entrance door hardware.  
25  
26 At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip  
27 and mortised into door edge.  
28  
29 At exterior doors, provide weather sweeps applied to door bottoms.  
30  
31 Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest  
32 extent possible. Cut, drill, and tap for factory-installed entrance door hardware before  
33 applying finishes.  
34  
35 After fabrication, clearly mark components to identify their locations in Project according to  
36 Shop Drawings.

37  
38 **ALUMINUM FINISH**

- 39  
40 Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm (0.7 mil) or thicker – match  
41 existing  
42

43  
44 **PART 3 - EXECUTION**

45  
46 **EXAMINATION**

- 47  
48 Examine areas and conditions for compliance with requirements for installation tolerances and other  
49 conditions affecting performance of the Work.  
50  
51 Proceed with installation only after unsatisfactory conditions have been corrected.  
52

53 **INSTALLATION**

54  
55 **General:**

- 56  
57 Do not install damaged components.  
58

- 1 Fit joints to produce hairline joints free of burrs and distortion.  
2  
3 Rigidly secure nonmovement joints.  
4  
5 Install anchors with separators and isolators to prevent metal corrosion and electrolytic  
6 deterioration.  
7  
8 Install air movement baffles of mineral fiber insulation in vertical members and elsewhere as  
9 shown.  
10  
11 Seal joints watertight unless otherwise indicated.  
12  
13 **Metal Protection:**  
14  
15 Where aluminum will contact dissimilar metals, protect against galvanic action by painting  
16 contact surfaces with primer or applying sealant or tape, or by installing nonconductive  
17 spacers as recommended by manufacturer for this purpose.  
18  
19 Where aluminum will contact concrete or masonry, protect against corrosion by painting  
20 contact surfaces with bituminous paint.  
21  
22 Install components to drain water passing joints, condensation occurring within framing members,  
23 and moisture migrating within the system to exterior.  
24  
25 Fill void between substrate and sill starter with foam insulation.  
26  
27 Install components plumb and true in alignment with established lines and grades, and without warp  
28 or rack.  
29  
30 **Entrance Doors:** Install doors to produce smooth operation and tight fit at contact points.  
31  
32 **Exterior Doors:** Install to produce weathertight enclosure and tight fit at weather stripping.  
33  
34 **Field-Installed Entrance Door Hardware:** Install surface-mounted entrance door hardware  
35 according to entrance door hardware manufacturers' written instructions using concealed  
36 fasteners to greatest extent possible.  
37  
38 Install perimeter joint sealants as specified in Section 07 92 00 "Joint Sealants" to produce  
39 weathertight installation.  
40  
41 **ERECTION TOLERANCES**  
42  
43 Install aluminum-framed systems to comply with the following maximum erection tolerances:  
44  
45 **Location and Plane:** Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4  
46 inch over total length.  
47  
48 **Alignment:** Limit offset from true alignment to 1/32 inch.  
49  
50 **Diagonal Measurements:** Limit difference between diagonal measurements to 1/8 inch.  
51  
52 **FIELD QUALITY CONTROL**  
53  
54 Repair or remove work if test results and inspections indicate that it does not comply with specified  
55 requirements.  
56  
57 Additional testing and inspecting, at Contractor's expense, will be performed to determine  
58 compliance of replaced or additional work with specified requirements.

- 1
- 2 Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- 3
- 4 Prepare test and inspection reports.
- 5
- 6 **ADJUSTING**
- 7
- 8 Adjust operating entrance door hardware and window units to function smoothly as recommended by
- 9 manufacturer.
- 10
- 11 For entrance doors accessible to people with disabilities, adjust closers to provide a
- 12 3 second closer sweep period for doors to move from a 70-degree open position to 3 inches
- 13 from the latch, measured to the leading door edge.
- 14
- 15
- 16 **END OF SECTION**

1    **SECTION 08 71 00 - DOOR HARDWARE**

2  
3  
4    **PART 1 - GENERAL**

5  
6    **RELATED DOCUMENTS**

7  
8    Drawings and general provisions of the Contract, including Construction Documents and  
9    Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this Section.

10  
11   **SUMMARY**

12  
13    Door hardware for swinging doors

14  
15        28 13 00 "Access Control" for access control devices installed at door openings and  
16        provided as part of a security system.

17  
18   **SUBMITTALS**

19  
20    Product Data: For each type of product indicated. Include construction and installation details,  
21    material descriptions, dimensions and profiles of individual components, and finishes.

22  
23    Shop Drawings: For electrified door hardware, including:

24  
25        Wiring Diagrams: For power, signal, and control wiring:

26  
27            Details of interface of electrified door hardware and building safety and security  
28            systems.

29  
30            Schematic diagram of systems that interface with electrified door hardware.

31  
32            Point-to-point wiring.

33  
34            Risers.

35  
36            Elevations of doors controlled by electrified door hardware.

37  
38        Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

39  
40    Door Hardware Schedule: The finish hardware supplier shall, prior to ordering and/or delivering,  
41    prepare and submit to Architect within ten days after award of contract an electronic PDF detailed  
42    and engineered, vertical type hardware schedule conforming to DHI publication, "Sequence and  
43    Format of the Hardware Schedule". Prepare schedule under the direct supervision of an Architectural  
44    Hardware Consultant (AHC). Hardware schedules submitted without the AHC's signature will be  
45    rejected without review. Should any material be ordered without proper coordination, it shall be  
46    replaced at no additional cost to the owner.

47  
48        Submittal Sequence: Submit door hardware schedule concurrently with submissions of  
49        Product Data, Shop Drawings and Samples. Coordinate submission of door hardware  
50        schedule with scheduling requirements of other work to facilitate the fabrication of other work  
51        that is critical in Project construction schedule.

52  
53        Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and  
54        Format for the Hardware Schedule." Use same door numbers as used in Construction  
55        Documents.

- 1           Content:  
2  
3           Identification number, location, size, hand, fire rating, and material of each door and  
4           frame.  
5  
6           Location of each door hardware set, cross-referenced to floor plans and door  
7           schedule.  
8  
9           Complete designations of every item required for each door or opening including  
10          name and manufacturer, type, style, function, size, quantity, and finish.  
11  
12          Description of each electrified door hardware function, including location, sequence  
13          of operation, and interface with other building control systems.  
14  
15          Fastenings and other pertinent information.  
16  
17          Explanation of abbreviations, symbols, and codes contained in schedule.  
18  
19          Mounting locations for door hardware.  
20  
21          List of related door devices specified in other Sections for each door and frame.  
22  
23          Engineering Responsibility: Hardware supplier is responsible to properly coordinate  
24          mechanical hardware and electronic hardware specified for each door and ensure  
25          that the specified hardware will all work together without any mounting or electrical  
26          conflicts. If any conflicts are addressed, they must be addressed at time of hardware  
27          submittal for Architect to review. Supplier is responsible to provide suggested  
28          resolutions for every issue of conflict they request information on. Any material that  
29          is ordered, and will not fit on doors and frames and is required for the intended use,  
30          such material shall be removed and replaced at no additional cost to the owner.  
31  
32          Where hardware is specified to match existing or when specified on existing  
33          openings, field verify existing conditions, swings and functions prior to submitting  
34          schedule for approval. Clearly indicate on submittals any deviations from hardware  
35          specified and why the additional or deviated hardware is required. Any material that  
36          is ordered, and will not fit on existing doors and frames and is required for the  
37          intended use, such material shall be removed and replaced at no additional cost to  
38          the owner.  
39  
40          Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying  
41          diagram and index each key set to unique door designations that are coordinated with the Contract  
42          Documents.  
43  
44          Samples for Verification:  
45  
46                  Each finish required, except primed finish, minimum 1 x 2 inch plate.  
47  
48                  If requested, full size units of exposed door hardware in specified finish. Tag with full  
49                  description for coordination with the hardware schedule.  
50  
51                  Samples will be returned to Contractor. Units that are acceptable and remain  
52                  undamaged through submittal process may be incorporated into the Work, within  
53                  limitations of keying requirements.  
54  
55          Qualification Data: For Installer.  
56  
57          Warranty: As specified in this Section.  
58

1 Maintenance Data: For each type of door hardware to include in maintenance manuals. Include  
2 final hardware schedule and keying schedule.

3

#### 4 QUALITY ASSURANCE

5

6 Installer Qualifications: Supplier of products indicated and an employer of workers trained and  
7 approved by product manufacturers and who is an Architectural Hardware Consultant with  
8 appropriate certification from DHI and who is available during the course of the Work to consult with  
9 Contractor, Architect, and Owner about door hardware and keying.

10

11 Warehouse Facilities: In Project's vicinity.

12

13 Scheduling Responsibility: Preparation of door hardware and keying schedules.

14

15 Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door  
16 hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a  
17 qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure  
18 according to NFPA 252 or UL 10C, unless otherwise indicated.

19

20 Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing  
21 agency acceptable to authorities having jurisdiction.

22

23 Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not  
24 require use of a key, tool, or special knowledge for operation.

25

26 Accessibility Requirements: For door hardware on doors in an accessible route, comply with  
27 ICC/ANSI A117.1.

28

29 Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist  
30 and that operate with a force of not more than 5 lbf.

31

32 Comply with the following maximum opening-force requirements:

33

34 Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.

35

36 Sliding or Folding Doors: 5 lbf applied parallel to door at latch.

37

38 Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

39

40 Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than  
41 1/2 inch high.

42

43 Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will  
44 take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading  
45 edge of the door.

46

47 Keying Conference: In addition to Owner, Contractor and Architect, conference participants shall  
48 also include Installer's Architectural Hardware Consultant and Owner's security consultant.

49 Incorporate keying conference decisions into final keying schedule after reviewing door hardware  
50 keying system including, but not limited to, the following:

51

52 Function of building, flow of traffic, purpose of each area, degree of security required, and  
53 plans for future expansion.

54

55 Lock functions.

56

57 Preliminary key system schematic diagram.

58

- 1 Requirements for key control system.  
2  
3 Requirements for access control.  
4  
5 Address for delivery of keys.  
6  
7 Preinstallation Conference: Review methods and procedures related to electrified door hardware  
8 including, but not limited to, the following:  
9  
10 Review and finalize construction schedule and verify availability of materials, Installer's  
11 personnel, equipment, and facilities needed to make progress and avoid delays.  
12  
13 Inspect and discuss preparatory work performed by other trades.  
14  
15 Inspect and discuss electrical roughing-in for electrified door hardware.  
16  
17 Review sequence of operation for each type of electrified door hardware.  
18  
19 Review required testing, inspecting, and certifying procedures.  
20  
21 DELIVERY, STORAGE, AND HANDLING  
22  
23 Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to  
24 Project site.  
25  
26 Tag each item or package separately with identification related to the hardware schedule, and  
27 include basic installation instructions, templates, and necessary fasteners with each item or package.  
28  
29 COORDINATION  
30  
31 Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared.  
32 Check Shop Drawings of other work to confirm that adequate provisions are made for locating and  
33 installing door hardware to comply with indicated requirements.  
34  
35 Security: Coordinate installation of door hardware, keying, and access control with Owner's security  
36 consultant.  
37  
38 Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with  
39 connections to power supplies and building safety and security systems.  
40  
41 Existing Openings: Where new hardware components are scheduled for application to existing  
42 construction or where modifications to existing door hardware are required, field verify existing  
43 conditions and coordinate installation of door hardware to suit opening conditions and to provide for  
44 proper operation.  
45  
46 WARRANTY  
47  
48 Manufacturer's standard form in which manufacturer agrees to repair or replace components of door  
49 hardware which fail in materials or workmanship within specified warranty period.  
50  
51 Failures include, but are not limited to, the following:  
52  
53 Structural failures including excessive deflection, cracking, or breakage.  
54  
55 Faulty operation of operators and door hardware.  
56  
57 Deterioration of metals, metal finishes, and other materials beyond normal  
58 weathering and use.

1  
2 Warranty Period: Three years from date of Substantial Completion, except as follows:

3  
4 Electromagnetic Locks: Five years from date of Substantial Completion.

5  
6 Exit Devices: Two years from date of Substantial Completion.

7  
8 Manual Closers: 10 years from date of Substantial Completion.

9  
10 **MAINTENANCE SERVICE**

11  
12 Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance  
13 instructions as needed for Owner's continued adjustment, maintenance, and removal and  
14 replacement of door hardware.

15  
16  
17 **PART 2 - PRODUCTS**

18  
19 **SCHEDULED DOOR HARDWARE**

20  
21 Provide door hardware for each door as scheduled in Part 3 "Hardware Group Schedule" Article to  
22 comply with requirements in this Section.

23  
24 Requirements for design, grade, function, finish, size and other distinctive qualities of each type of  
25 door hardware are indicated by product designations of the first manufacturer listed.

26 Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name  
27 displayed in a visible location except in conjunction with required fire-rated labels and as otherwise  
28 approved by Architect.

29  
30 Manufacturer's identification is permitted on rim of lock cylinders only.

31  
32  
33 Continuous Hinges: BHMA A156.26; minimum 0.120 inch hinge leaves with minimum overall width  
34 of 4 inches ; fabricated to full height of door and frame, except as otherwise indicated, and to  
35 template screw locations; with components finished after milling and drilling are complete.

36  
37 Gear Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a  
38 continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

39  
40 Manufacturers:

41  
42 McKinney Products Company; an ASSA ABLOY Group company

43  
44 At exterior doors, provide hinges 1 inch less in length than door height to accommodate full  
45 width surface sweeps.

46  
47 Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame  
48 and armature plate attached to door; full-exterior or full-interior type, as required by application  
49 indicated. with minimum holding force strength of 1,100 pounds. Locks to be capable of either 12 or  
50 24 voltage and be UL listed for use on fire rated door assemblies. As indicated in Hardware Sets,  
51 provide specified mounting brackets and housings. Power supply to be by the same manufacturer as  
52 the lock with combined products having a lifetime replacement warranty.

53  
54 Manufacturers:

55  
56 Securitron Magnalock Corporation; an Assa Abloy Group company.

57 Exit Devices and Auxiliary Items: BHMA A156.3. Include deadlocking feature.

- 1 Manufacturers:  
2  
3 Yale Locks and Hardware; an Assa Abloy Group company.  
4  
5 Except on fire-rated doors, where closers are provided on doors equipped with exit devices,  
6 equip the units with keyed dogging device to hold the push bar down and the latch bolt in the  
7 open position.  
8  
9 Strikes: Manufacturer's standard strike with curved lip extended to protect frame and strike box.  
10  
11  
12 Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.  
13  
14 Manufacturer: Match Owner's existing Key System.  
15  
16 Keys: Nickel silver.  
17  
18 Quantity: 3 change keys for each lock  
19  
20 Stamping: Permanently inscribe each key with a visual key control number and  
21 include the following notation: DO NOT DUPLICATE.  
22  
23 Cross-Index System: Multiple-index system for recording key information. Include  
24 three receipt forms for each key-holding hook. Set up by key control manufacturer.  
25  
26  
27 Automatic Door Operators: Match Facility Standards; rack-and-pinion hydraulic type with adjustable  
28 sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with  
29 manufacturer's written recommendations for size of door closers depending on size of door,  
30 exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to  
31 meet field conditions and requirements for opening force.  
32  
33  
34 Overhead Stops and Holders: BHMA A156.8.  
35  
36 Manufacturers:  
37  
38 Rixson Door Controls.  
39 Rockwood Manufacturing Company.  
40  
41 Door Trim Units: BHMA A156.6.  
42  
43 Push/Pull Units: Provide Manufacturer's standard exposed fasteners for installation;  
44 through-bolted for matched pairs, but not for single units.  
45  
46 Protection Plates, armor, kick or mop: Fabricate not more than 1-1/2 inches less than door  
47 width on stop side and not more than 1/2 inch less than door width on pull side, by the  
48 height indicated.  
49  
50 Edge Trim: Fabricate of stainless steel, not more than 1/2 inch nor less than 1/16 inch  
51 smaller in length than door dimension.  
52  
53 Base metal: Stainless steel, 0.050" (U.S. 18 gauge)  
54  
55 Manufacturers:  
56  
57 Rockwood Manufacturing Co.  
58

1 Door Gasketing (weather-stripping): BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of  
2 crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with  
3 resilient or flexible seal strips that are easily replaceable and readily available from stocks  
4 maintained by manufacturer.

5  
6 Manufacturers:

7  
8 National Guard Products.  
9 Pemko Manufacturing Co.; an ASSA ABLOY Group company.  
10 Reese Enterprises, Inc.  
11 Zero International

12  
13 Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

14  
15 Manufacturers:

16  
17 National Guard Products.  
18 Pemko Manufacturing Co.; an ASSA ABLOY Group company.  
19 Reese Enterprises, Inc.  
20 Zero International

21  
22 FASTENERS

23  
24 Provide door hardware manufactured to comply with published templates prepared for machine,  
25 wood, and sheet metal screws. Provide screws that comply with commercially recognized industry  
26 standards for application intended, except aluminum fasteners are not permitted. Provide Phillips  
27 flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

28  
29 Where possible, provide concealed fasteners for door hardware units that are exposed when  
30 door is closed, except as otherwise indicated. Do not use through bolts for installation where  
31 bolt head or nut on opposite face is exposed unless it is the only means of securely  
32 attaching the door hardware. Where through bolts are used on hollow door and frame  
33 construction, provide sleeves for each through bolt.

34  
35 Fire-Rated Applications:

36  
37 Wood or Machine Screws: For the following:

38  
39 Hinges mortised to doors or frames; use threaded-to-the-head wood screws  
40 for wood doors and frames.

41  
42 Strike plates to frames.

43  
44 Closers to doors and frames.

45  
46 Steel Through Bolts: For the following unless door blocking is provided:

47  
48 Surface hinges to doors.

49  
50 Closers to doors and frames.

51  
52 Surface-mounted exit devices.

53  
54 Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended  
55 Fasteners for Wood Doors."

56  
57 Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and  
58 elsewhere as indicated.

1  
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58

## FINISHES

Provide finishes complying with BHMA A156.18.

Satin stainless steel 630 (US32D) or stain chrome 626/652 (US26D) as otherwise indicated.

Closers, Sweeps and Hinges for Aluminum Doors: Painted or powder-coated to match doors.

Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### EXAMINATION

Examine doors and frames for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

Proceed with installation only after unsatisfactory conditions have been corrected.

### PREPARATION

Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

### INSTALLATION

Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

Standard Steel Doors and Frames: ANSI/SDI A250.8.

Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

1  
2 Drill and countersink units that are not factory prepared for anchorage fasteners. Space  
3 fasteners and anchors according to industry standards.  
4

5 Lock Cylinders: Install construction cores to secure building and areas during construction period.  
6

7 Replace construction cores with permanent cores as indicated in keying schedule or if not  
8 indicated, as directed by Owner.  
9

10 Key Control System: Tag keys and place them on markers and hooks in key control system cabinet,  
11 as determined by final keying schedule.  
12

13 Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible  
14 ceilings. Verify location with Architect.  
15

16 Thresholds: Set thresholds for exterior doors in full bed of sealant indicated in Section 07 92 00  
17 "Joint Sealants".  
18

#### 19 ADJUSTING

20

21 Adjust and check each operating item of door hardware and each door to ensure proper operation or  
22 function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door  
23 control devices to compensate for final operation of heating and ventilating equipment and to comply  
24 with referenced accessibility requirements.  
25

26 Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock  
27 bolt.  
28

29 Door Closers: Adjust sweep period to comply with accessibility requirements and  
30 requirements of authorities having jurisdiction.  
31

#### 32 CLEANING AND PROTECTION

33

34 Clean adjacent surfaces soiled by door hardware installation.  
35

36 Clean operating items as necessary to restore proper function and finish.  
37

38 Provide final protection and maintain conditions that ensure that door hardware is without damage or  
39 deterioration at time of Substantial Completion.  
40

#### 41 DEMONSTRATION

42

43 Engage a factory-authorized service representative to train Owner's maintenance personnel to  
44 adjust, operate, and maintain door hardware and door hardware finishes.  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58

1 **HARDWARE GROUP SCHEDULE**

2  
3 **HG-1 DOUBLE-EGRESS PAIR - FAIL SAFE MAGNETIC LOCKS X ACCESS CONTROL**  
4 **READERS (BOTH SIDES)**

5  
6 **Doors:** 1C108.1 Alt #2; 1C108.2 Alt #2, 1C125A.1 Alt #2, 1C125A.2 Alt #2, 1C151.1 Alt #2,  
7 1C151.2 Alt #2, 1D108.1 Base Bid, 1D108.2 Base Bid, 1D124.1 Base Bid, 1D124.2 Base Bid,  
8 1D151.1 Base Bid, 1D151.2 Base Bid, 1G164.1 Alt #2, 1G164.2 Alt #2, 1G175.1 Base Bid, 1G175.2  
9 Base Bid

10  
11 Note: Existing hardware to remain. Field verify existing conditions.

12	1	Magnetic Lock	M680BD	SU
13	1	Door Position Switch	DPS	SU
14		Provide the following per pair of doors:		
15	1	Fire Alarm Reset	FAR	SU
16	1	Power Supply	BPS-24 Series (for magnetic lock)	SU
17	2	Access Control Reader	Furnished by Section 28 13 00	
18	1	REX-Push Button – IN	Furnished by Section 28 13 00	
19	1	REX-Push Button – OUT	Furnished by Section 28 13 00	
20	1	Keypad	MK-Series (as required)	Securitron
21	1	Mortise Cylinder	1-1/8" Match Facility Standard	US26D Facility Std.

22  
23 Locate Keypad behind Nurse Station. Keypad to control locking arrangements: one 16-bed unit  
24 or two 8-bed units.

25  
26 Electrical Boxes, Conductors, and Final Connections to magnetic locks, power supplies, fire alarm  
27 reset, card reader and keypad shall be the responsibility of Division 26. Electrical Service to power  
28 supplies shall be the responsibility of Division 26.

29  
30 Interfacing of Access Control equipment with hardware specified in this section shall be the  
31 responsibility of the Access Control System Supplier.

32  
33 **Functions:**

- 34 • The doors are normally closed.
- 35 • Special Egress Arrangement (UNLOCKED): Turning keypad disrupts circuit to magnetic  
36 locks unlocking doors and GREEN LED is illuminated.
- 37 • Pushing door allows free egress.
- 38 • Special Egress Arrangement (Secured BOTH Directions): Turning keypad energizes  
39 magnetic locks securing doors both directions and RED LED is illuminated.
  - 40 ○ Presenting a valid credential to either access control reader or remote switch at Nurse's  
41 station disrupts circuit to magnetic locks allowing free passage for a preset time and  
42 then magnetic locks re-secure.
- 43 • Whenever the safety detector (smoke, fire, water flow, etc.) signals that an emergency  
44 condition is present, power is disrupted and both of the magnetic locks will unlock  
45 instantaneously, and the doors may be opened immediately in the usual manner by pushing  
46 through the opening. After authorized personnel reset the life safety detector system, the  
47 magnetic locks must be reset by actuation of the key cylinder in the Fire Alarm Reset located  
48 next to door. This will clear the alarm state and power will be allowed to both magnetic locks  
49 securing doors.
- 50 • In the event of a power loss, the magnetic locks become completely inactive, pushing  
51 through the opening will allow immediate egress.
- 52 • Unit requires 24-hour staffing. Staff to be within 3 floors or 300 ft horizontal distance of the  
53 access door to receive notice. In event of emergency, door can be remotely released at  
54 Nurse Station. Staff required releasing locks for evacuation within 2 minutes of alarm. Staff  
55 required carrying key to operate lock.
- 56 • Access Control System shall log unsecured violation if door is not closed within a preset time  
57 limit (programmed from Card Access System software).

1	<b><u>HG-2</u> EXTERIOR – DEADLOCK – AUTO DOOR OPERATOR</b>			
2				
3	<b>Doors:</b> 1C144 Alt #3, 1D101 Alt #1			
4				
5	1	Continuous Hinge	MCK-25HD	CLR MK
6	1	Deadlatch	MS1850S	628 AR
7	2	Cylinders	to match existing key system	US26D
8	1	Magnetic Lock	M680BD	SU
9	1	Set Push-Pull Bars	BF15847	US32D RO
10	1	Overhead Stop	1-x36	630 RX
11	1	Threshold	171	AL PE
12	1	Rain Drip	346C	PE
13	1	Auto Door Bottom	MCK420 PK	PE
14	1	Set Weatherstrip	MCK379 R	PE
15	1	Zone Light Panel	ZLP-1	
16	1	Door Position Switch	DPS	SU
17	1	Latch Monitor	LMD-1	SU
18	1	Power Supply	BPS-24	SU
19	1	Auto Door Operator	by others (Match Facility Standards)	

20

21 Electrical Boxes, Conductors, and Final Connections to magnetic locks, door position switch and  
 22 latchbolt monitor switch shall be the responsibility of Division 26. Electrical Service to power supplies  
 23 shall be the responsibility of Division 26.

24

25 Interfacing of Access Control equipment with hardware specified in this section shall be the  
 26 responsibility of the Access Control System Supplier.

27

28 Function:

29 **Door at Rest:** Door is closed and locked. Red LED inside indicates deadbolt is engaged and door is  
 30 secure. Deadbolt engagement disables automatic operator actuator both sides.

31 **Operation:** Rotating key in cylinder either side retracts deadbolt. Green LED indicates door is open.  
 32 Automatic operator actuators either side are activated. Door acts as push-pull or may be opened by  
 33 automatic operator.

34 **Power Failure:** In case of loss of power, magnetic lock releases and automatic operator is disabled.  
 35 Access Control System shall log unsecured violation if door is not closed within a preset time limit  
 36 (programmed from Card Access System software).

37

38

39 END OF SECTION

1     **SECTION 08 80 00 - GLAZING**

2  
3  
4     **PART 1 - GENERAL**

5  
6     **RELATED DOCUMENTS**

7  
8     Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9     and Division 1 Specification Sections, apply to this Section.

10  
11    **SUMMARY**

12  
13    Glazing for the following applications, including those specified in other Sections where glazing  
14    requirements are specified by reference to this Section:

15  
16         Doors.

17  
18    Related Sections includes:

19  
20         Division 08 Section "Aluminum Framed Entrances and Storefronts"

21  
22    **REFERENCES**

23  
24    ASTM:   American Society for Testing and Materials  
25    CFR:     Code of Federal Regulations  
26    GANA:    Glass Association of North America  
27    IGMA:    The Insulation Glass Manufacturers Alliance  
28    SIGMA:   The Sealed Insulation Glass Manufacturers Alliance

29  
30    **DEFINITIONS**

31  
32    Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C 1036.

33  
34    Inter-space:   Space between lites of an insulating-glass unit that contains dehydrated air or a  
35    specified gas.

36  
37    Deterioration of Coated Glass:   Defects developed from normal use that are attributed to the  
38    manufacturing process and not to causes other than glass breakage and practices for maintaining  
39    and cleaning coated glass contrary to manufacturer's written instructions.   Defects include peeling,  
40    cracking, and other indications of deterioration in metallic coating.

41  
42    Deterioration of Insulating Glass:   Failure of hermetic seal under normal use that is attributed to the  
43    manufacturing process and not to causes other than glass breakage or practices for maintaining and  
44    cleaning insulating glass contrary to manufacturer's written instructions.   Evidence of failure is the  
45    obstruction of vision by dust, moisture, or film on interior surfaces of glass.

46  
47    **PERFORMANCE REQUIREMENTS**

48  
49    General:   Provide glazing systems capable of withstanding normal thermal movement and wind and  
50    impact loads (where applicable) without failure, including loss or breakage of glass attributable to the  
51    following:   defective manufacture, fabrication or installation; failure of sealants or gaskets to remain  
52    watertight or airtight; deterioration of glazing materials; or other defects in construction.

53  
54    Thermal and Optical Performance Properties:   Provide glass with performance properties specified  
55    based on manufacturer's published test data, as determined according to procedures indicated  
56    below:

1 For insulating-glass units, properties are based on units of thickness indicated for overall unit  
2 and for each lite.

3

4 Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for  
5 the following methodologies:

6

7 U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F.

8 Solar Heat Gain Coefficient: NFRC 200.

9 Solar Optical Properties: NFRC 300.

10

## 11 SUBMITTALS

12

13 Product Data: For each glass product and glazing material indicated.

14

15 Samples: For the following products, in the form of 12-inch- square Samples for glass and of 12-inch  
16 long Samples for sealants. Install sealant samples between two strips of material representative in  
17 color of the adjoining framing system.

18

19 Insulating glass

20

21 Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a  
22 schedule listing glass types and thickness for each size opening and location.

23

24 Product Certificates: Signed by Manufacturers of glass and glazing products certifying that products  
25 furnished comply with requirements.

26

27 Qualification Data: For installers.

28

29 Pre-construction Adhesion and Compatibility Test Report: From glazing sealant manufacturer  
30 indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for  
31 compatibility with glass and other glazing materials.

32

33 Warranties: Special warranties specified in this Section.

34

## 35 QUALITY ASSURANCE

36

37 Installer Qualifications: An experienced installer who has completed glazing similar in material,  
38 design, and extent to that indicated for this Project; whose work has resulted in glass installations  
39 with a record of successful in-service performance; and who employs glass installers for this Project  
40 who are certified under the National Glass Association's Certified Glass Installer.

41

42 Source Limitations for Glass: Obtain each type of glass through one source from a single  
43 Manufacturer.

44

45 Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a  
46 single Manufacturer for each product and installation method indicated.

47

48 Glazing Publications: Comply with published recommendations of glass product manufacturers and  
49 organizations below, unless more stringent requirements are indicated. Refer to these publications  
50 for glazing terms not otherwise defined in this Section or in referenced standards.

51

52 IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed  
53 Insulating Glass Units."

54

55 Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one  
56 component lite of units with appropriate certification label of the following testing and inspecting  
57 agency:

58

- 1 Insulating Glass Certification Council.  
2
- 3 Pre-installation Conference: Conduct conference at Project site to comply with requirements in  
4 Division 1 Section "Project Management and Coordination."  
5
- 6 **DELIVERY, STORAGE, AND HANDLING**  
7
- 8 Protect glazing materials according to manufacturer's written instructions and as needed to prevent  
9 damage to glass and glazing materials from condensation, temperature changes, direct exposure to  
10 sun, or other causes.  
11
- 12 Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature  
13 conditions are outside limits permitted by glazing material manufacturers or when glazing channel  
14 substrates are wet from rain, frost, condensation, or other causes.  
15
- 16 **WARRANTY**  
17
- 18 Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made  
19 out to Owner and signed by coated-glass Manufacturer agreeing to replace coated-glass units that  
20 deteriorate as defined in "Definitions" Article, f.o.b. the Project site, within specified warranty period  
21 indicated below.  
22
- 23 Warranty Period: Ten (10) years from date of Substantial Completion.  
24
- 25 Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to  
26 Owner and signed by insulating-glass Manufacturer agreeing to replace insulating-glass units that  
27 deteriorate as defined in "Definitions" Article, f.o.b. the Project site, within specified warranty period  
28 indicated below.  
29
- 30 Warranty Period: Ten (10) years from date of Substantial Completion.  
31  
32
- 33 **PART 2 - PRODUCTS**  
34
- 35 **MANUFACTURERS**  
36
- 37 Match existing conditions, or approved equal.  
38
- 39 **GLASS PRODUCTS**  
40
- 41 Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Quality-Q3; of class indicated.  
42
- 43 Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind,  
44 and condition indicated.  
45
- 46 Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to  
47 bottom edge of glass as installed, unless otherwise indicated. The deviation from flatness at  
48 any peak (peak to valley deviation) shall not exceed 0.003 inch in the center of a lite and  
49 shall not exceed 0.008 inch within 10.5 inches of the leading or trailing edge.  
50
- 51 Furnaces must use a continuous sweeping quench to minimize "quench marks" on  
52 heat treated glass.  
53
- 54 Fully tempered (FT) glass shall be heat soak tested to eliminate the potential of  
55 spontaneous breakage due to nickel-sulfite inclusions.  
56
- 57 For uncoated glass, comply with requirements for Condition A.  
58

- 1 For coated vision glass, comply with requirements for Condition C (other coated glass).  
2  
3 Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a  
4 dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements  
5 specified.  
6  
7 Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants:  
8  
9 Spacer Material: Thermally improved warm edge type, fabricated from aluminum or steel  
10 with a polymer bridge, or extruded polymer.  
11  
12 Manufacturers:  
13  
14 Azon USA  
15 Approved substitute  
16  
17 Color: Selected by Architect from manufacturer's standard range.  
18  
19 Desiccant: Molecular sieve or silica gel, or blend of both.  
20

## 21 GLAZING GASKETS

- 22  
23 Dense Compression Gaskets: Molded or extruded gaskets of one of the materials indicated below,  
24 complying with standards referenced with name of elastomer indicated below, and of profile and  
25 hardness required to maintain watertight seal:  
26  
27 Neoprene, ASTM C 864.  
28 EPDM, ASTM C 864.  
29 Silicone, ASTM C 1115.  
30 Thermoplastic polyolefin rubber, ASTM C 1115.  
31  
32 Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of one of the  
33 materials indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness  
34 required to maintain watertight seal:  
35  
36 Neoprene.  
37 EPDM.  
38 Silicone.  
39 Thermoplastic polyolefin rubber.  
40

## 41 GLAZING SEALANTS

- 42  
43 Compatibility: Select glazing sealants that are compatible with one another and with other materials  
44 they will contact, including glass products, seals of insulating-glass units, and glazing channel  
45 substrates, under conditions of service and application, as demonstrated by sealant manufacturer  
46 based on testing and field experience.  
47  
48 Suitability: Comply with sealant and glass Manufacturers' written instructions for selecting glazing  
49 sealants suitable for applications indicated and for conditions existing at time of installation.  
50  
51 Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.  
52  
53 Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each  
54 liquid-applied chemically curing sealant specified, including those referencing ASTM C 920  
55 classifications for type, grade, class, and uses related to exposure and joint substrates.  
56  
57 Type and Grade: S (single component) and NS (non-sag).  
58

- 1 Use Related to Exposure: NT (non-traffic).  
2  
3 Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates  
4 indicated, O.  
5  
6 Use O Glazing Substrates: color anodic aluminum.  
7  
8 Applications: Glazing; toe, heel and cap beads.  
9  
10 Class 50 Neutral-Curing Silicone Glazing Sealant:  
11  
12 Products:  
13  
14 Dow Corning Corporation; 795.  
15 GE Silicones; SilPruf NB SCS9000.  
16 Pecora Corporation; 895.  
17 Tremco; Spectrem 2 or Spectrem 3.  
18  
19 Class 25 Neutral-Curing Silicone Glazing Sealant:  
20  
21 Products:  
22  
23 Dow Corning Corporation; 799.  
24 GE Silicones; UltraGlaze SSG4000.  
25 Tremco; Proglaze SSG  
26  
27 Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies  
28 to obtain fire-protection rating.  
29  
30 **GLAZING TAPES**  
31  
32 Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content  
33 of 100 percent; non-staining and non-migrating in contact with nonporous surfaces; with or without  
34 spacer rod as recommended in writing by tape and glass manufacturers for application indicated;  
35 packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800  
36 for products indicated below:  
37  
38 AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.  
39  
40 AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous  
41 pressure.  
42  
43 **MISCELLANEOUS GLAZING MATERIALS**  
44  
45 Provide products of material, size, and shape complying with referenced glazing standard,  
46 requirements of manufacturers of glass and other glazing materials for application indicated, and  
47 with a proven record of compatibility with surfaces contacted in installation.  
48  
49 Cleaners, Primers, and Sealers: Types recommended by sealant or gasket Manufacturer.  
50  
51 Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus  
52 5.  
53  
54 Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness  
55 required by glass manufacturer to maintain glass lites in place for installation indicated.  
56  
57 Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side  
58 walking).

1  
2 Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density  
3 to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

4  
5 Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain  
6 fire-resistance rating.

7  
8 **FABRICATION**

9  
10 Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face  
11 clearances, edge and surface conditions, and bite complying with written instructions of product  
12 Manufacturer and referenced glazing publications, to comply with system performance requirements.

13  
14 Minimum Glass Thickness: 6.0 mm (1/4-inch) unless otherwise indicated.

15  
16 Insulating-Glass Units (IG):

17  
18 Match existing conditions.

19  
20 Overall Unit Thickness: 1-inch.

21  
22 Inter-space Content: Air.

23  
24 Outdoor Lite: Class1 (clear) float glass:

25  
26 Annealed or heat-treated, Kind HS (heat-strengthened) where needed to resist  
27 thermal stresses induced by differential shading of individual glass lites, unless  
28 otherwise indicated.

29  
30 Heat-treated, Kind FT (fully tempered) for exterior doors, sidelites, transoms and  
31 elsewhere as indicated.

32  
33 Visible Light Transmittance: 70 percent minimum.

34  
35 Winter Nighttime U-Factor: 0.29 maximum.

36  
37 Summer Daytime U-Factor: 0.27 maximum.

38  
39 Solar Heat Gain Coefficient: 0.39 maximum.

40  
41 Outdoor Visible Reflectance: 11 percent maximum.

42  
43  
44 **PART 3 - EXECUTION**

45  
46 **EXAMINATION**

47  
48 Examine framing members to receive glass for compliance with the following:

49  
50 Manufacturing and installation tolerances, including those for size, squareness, and offsets  
51 at corners.

52  
53 Presence and functioning of weep system.

54  
55 Minimum required face or edge clearances.

56  
57 Effective sealing between joints of glass-framing members.

58

- 1 Proceed with installation only after unsatisfactory conditions have been corrected.  
2
- 3 PREPARATION  
4
- 5 Clean glazing channels and other framing members receiving glass immediately before glazing.  
6 Remove coatings not firmly bonded to substrates.  
7
- 8 GLAZING, GENERAL  
9
- 10 Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other  
11 glazing materials, unless more stringent requirements are indicated, including those in referenced  
12 glazing publications.  
13
- 14 Protect glass edges from damage during handling and installation. Remove damaged glass from  
15 Project site and legally dispose of.  
16
- 17 Apply primers to joint surfaces where required for adhesion of sealants, as determined by pre-  
18 construction sealant-substrate testing.  
19
- 20 Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications,  
21 unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant  
22 suitable for heel bead.  
23
- 24 Do not exceed edge pressures stipulated by glass Manufacturers for installing glass lites.  
25
- 26 Provide spacers for glass lites where length plus width is larger than 50 inches as follows:  
27
- 28       Locate spacers directly opposite each other on both inside and outside faces of glass.  
29       Install correct size and spacing to preserve required face clearances, unless gaskets and  
30       glazing tapes are used that have demonstrated ability to maintain required face clearances  
31       and to comply with system performance requirements.  
32
- 33       Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width.  
34       With glazing tape, use thickness slightly less than final compressed thickness of tape.  
35
- 36 Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in  
37 glazing channel, as recommended in writing by glass Manufacturer and according to requirements in  
38 referenced glazing publications.  
39
- 40 Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.  
41
- 42 TAPE GLAZING  
43
- 44 Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with  
45 or protrude slightly above sightline of stops.  
46
- 47 Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to  
48 make them fit opening.  
49 Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover  
50 horizontal framing joints by applying tapes to jambs and then to heads and sills.  
51
- 52 Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal  
53 joints in tapes with compatible sealant approved by tape manufacturer.  
54
- 55 Do not remove release paper from tape until just before each glazing unit is installed.  
56

1 Center glass lites in openings on setting blocks and press firmly against tape by inserting dense  
2 compression gaskets formed and installed to lock in place against faces of removable stops. Start  
3 gasket applications at corners and work toward centers of openings.

4

#### 5 GASKET GLAZING (DRY)

6

7 Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings  
8 exactly, with allowance for stretch during installation.

9

10 Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with  
11 joints miter cut and bonded together at corners.

12

13 Center glass lites in openings on setting blocks and press firmly against soft compression gasket by  
14 inserting dense compression gaskets formed and installed to lock in place against faces of  
15 removable stops. Start gasket applications at corners and work toward centers of openings.  
16 Compress gaskets to produce a weather-tight seal without developing bending stresses in glass.  
17 Seal gasket joints with sealant recommended by gasket manufacturer.

18

19 Install gaskets so they protrude past face of glazing stops.

20

#### 21 SEALANT GLAZING (WET)

22

23 Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites  
24 and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass  
25 channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in  
26 place and in position to control depth of installed sealant relative to edge clearance for optimum  
27 sealant performance.

28

29 Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of  
30 sealant to glass and channel surfaces.

31

32 Tool exposed surfaces of sealants to provide a substantial wash away from glass.

33

#### 34 CLEANING AND PROTECTION

35

36 Protect exterior glass from damage immediately after installation by attaching crossed streamers to  
37 framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent  
38 labels, and clean surfaces.

39

40 Protect glass from contact with contaminating substances resulting from construction operations,  
41 including weld splatter. If, despite such protection, contaminating substances do come into contact  
42 with glass, remove substances immediately as recommended by glass manufacturer.

43

44 Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at  
45 frequent intervals during construction, but not less than once a month, for buildup of dirt, scum,  
46 alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

47

48 Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from  
49 natural causes, accidents, and vandalism, during construction period.

50

51 Wash glass on both exposed surfaces not more than four days before date scheduled for inspections  
52 that establish date of Substantial Completion. Wash glass as recommended in writing by glass  
53 manufacturer.

54

55

56 END OF SECTION

1    **SECTION 09 65 00 - RESILIENT FLOORING**

2  
3  
4    **PART 1 - GENERAL**

5  
6    RELATED DOCUMENTS

7  
8    Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9    and Division 01 Specification Sections, apply to this Section.

10  
11   SUMMARY

12  
13   Requirements for resilient flooring products indicated in Materials Schedule, including:

14  
15       Sheet flooring  
16       Wall base

17  
18   SUBMITTALS

19  
20   Shop Drawings: For each type of flooring. Include flooring layouts, locations of seams, edges,  
21   columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

22  
23   Samples for Verification: Each color and pattern of required:

24  
25       Sheet Flooring: Not less than 6-by-9-inch sections.

26  
27       Resilient Wall Base and Stair Accessories: Not less than 12 inches long.

28  
29   Relative Humidity, Calcium Chloride, Alkalinity and Adhesion Tests: Location diagrams and results  
30   showing compliance with requirements.

31  
32   Maintenance Data: For resilient products to include in maintenance manuals.

33  
34   QUALITY ASSURANCE

35  
36   Installer Qualifications: A qualified installer who employs workers for this Project who are competent  
37   in techniques required by manufacturer for flooring installation [and seaming method] indicated.

38  
39   Start of work without Architect approval of shop drawings is not permitted and unauthorized  
40   installations shall be replaced at Contractor's expense.

41  
42   Pre-installation Meeting:

43  
44       Review methods and procedure related to installation, including concrete subfloor testing  
45       and moisture mitigation, and manufacturer's written instructions, including recommendations  
46       for adhesives.

47  
48       Examine project conditions for compliance with requirements, including temperature and  
49       humidity.

50  
51       Review delivery and storage conditions before and during installation.

52  
53       Review temporary protection requirements.

54  
55       Review repair procedure after installation.

1 DELIVERY, STORAGE, AND HANDLING

2

3 Store resilient products and installation materials in dry spaces protected from the weather, with  
4 ambient temperatures maintained within range recommended by manufacturer, but not less than  
5 50° F or more than 90° F.

6

7 PROJECT CONDITIONS

8

9 Maintain temperature within range recommended by manufacturer, but not less than 65° F nor more  
10 than 95° F, and maintain relative humidity below 60%, in spaces to receive resilient flooring for the  
11 following time periods:

12

13 48 hours before installation.

14

15 During entire installation.

16

17 48 hours after installation.

18

19 After post-installation period, maintain temperatures within range recommended by  
20 manufacturer, but not less than 55° F or more than 95° F.

21

22 Close spaces to traffic during flooring installation.

23

24 Close spaces to traffic for 48 hours after flooring installation.

25

26 Install resilient products after other finishing operations, including painting, have been completed.

27

28 WARRANTY

29

30 Special Installation Warranty: Installer's written warranty, co-signed by Contractor, agreeing to  
31 provide labor and materials to replace resilient flooring and accessories that do not comply with  
32 requirements or that fail due to defects in manufacturing or installation, including inadequate subfloor  
33 preparation and adhesion failures. Warranty does not include deterioration or failure due to  
34 vandalism or abuse.

35

36 Warranty Period: 5 years from date of Substantial Completion.

37

38 EXTRA MATERIALS

39

40 Furnish extra materials of each type, color, and pattern installed, and that are packaged with  
41 protective covering for storage and identified with labels describing contents.

42

43 Sheet flooring: Furnish not less than 10 linear feet for every 500 linear feet or fraction  
44 thereof, in roll form and in full roll width.

45

46 Resilient Wall Base: Furnish not less than 10 linear feet for every 500 linear feet or fraction  
47 thereof.

48

49

50 **PART 2 - PRODUCTS**

51

52 MATERIALS

53

54 Provide products indicated in Material Schedule and, where applicable, in compliance with  
55 requirements below.

56

57

58

- 1 Resilient Wall Base:  
2  
3 Style: Cove (with top-set toe) at hard surface flooring, straight (toeless) at carpet.  
4  
5 Minimum Thickness: 0.125 inch.  
6  
7 Height: Match Existing.  
8  
9 Length: Coils in maximum length standard with manufacturer.  
10  
11 Outside Corners: Pre-molded.  
12  
13 Inside Corners: Job formed or pre-molded.  
14  
15 Surface: Smooth.  
16

#### 17 INSTALLATION MATERIALS

- 18  
19 Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended  
20 hydraulic cement based formulation provided or approved by resilient flooring manufacturer for  
21 applications indicated.  
22  
23 Specialty Coatings: As recommended by flooring and adhesive manufacturers to suit indicated  
24 resilient products and substrate conditions.  
25  
26 Adhesives: Water-resistant type recommended by flooring manufacturer to suit indicated resilient  
27 products and substrate conditions.  
28  
29 Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.  
30  
31 Color: Match field color of flooring.  
32  
33 Resilient Leveler Strips: Homogeneous polyvinyl chloride composition, with maximum taper of  
34 1/4 inch over 12 inch width, for installation under flooring to adjust edge thickness to match adjacent  
35 surfaces.  
36  
37 Product: Subfloor Leveler System; Johnsonite.  
38  
39 Metal Transition Strips: Extruded aluminum with mill finish of width shown, of height required to  
40 protect exposed edges of flooring, and in maximum available lengths to minimize running joints.  
41  
42 Floor Polish: Provide protective liquid floor polish products as recommended by flooring  
43 manufacturer.  
44  
45 Coordinate selection of floor polish with Owner's maintenance service.  
46  
47

### 48 **PART 3 - EXECUTION**

#### 49 EXAMINATION

- 50  
51  
52 Examine substrates for compliance with requirements for maximum moisture content and other  
53 conditions affecting performance of the work.  
54  
55 Verify that finishes of substrates comply with tolerances and other requirements specified in other  
56 Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that  
57 might interfere with adhesion of resilient products.  
58

- 1 Proceed with installation only after unsatisfactory conditions have been corrected.  
2
- 3 PREPARATION  
4
- 5 Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient  
6 flooring.  
7
- 8 Concrete Substrates: Prepare according to ASTM F 710.  
9
- 10 Verify that substrates are dry and free of curing compounds, sealers, and hardeners.  
11
- 12 Remove substrate coatings and other substances that are incompatible with adhesives and  
13 that contain soap, wax, oil, or silicone; use mechanical methods recommended by  
14 manufacturer of flooring, adhesive or specialty coating (if required), whichever is more  
15 stringent. Do not use solvents.  
16
- 17 Perform relative humidity, calcium chloride, alkalinity and adhesion tests indicated below and  
18 as additionally recommended by flooring and adhesive manufacturers.  
19
- 20 Perform relative humidity tests using in situ probes per ASTM F 2170.  
21
- 22 Conduct 3 tests for the first 1,000 square feet of flooring and one additional  
23 test for each 1,000 square feet thereafter.  
24
- 25 Maximum relative humidity level measurement shall not exceed 75%  
26
- 27 Conduct one test of each type indicated below for every 1,000 or less square feet of  
28 flooring. Conduct tests around the perimeters of the room and where moisture is  
29 evident.  
30
- 31 Anhydrous calcium chloride test per ASTM F1869.  
32
- 33 Maximum moisture-vapor-emission rate shall not exceed 3.0  
34 pounds per 1,000 square feet per 24 hours.  
35
- 36 Alkalinity Test: pH testing paper or phenolphthalein solution.  
37
- 38 Acceptable range 5 – 9.  
39
- 40 Adhesion Test: Adhere 3 foot x 3 foot sample of flooring to sub-floor and  
41 check for adhesion after 72 hours.  
42
- 43 Use moisture mitigation techniques, including shotblasting and application of specialty  
44 coatings as recommended by flooring and adhesive manufacturers to bring substrates into  
45 compliance with above testing requirements and provide specified warranty.  
46
- 47 Proceed with installation only after substrates pass testing and test results have been  
48 submitted to Architect.  
49
- 50 Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.  
51
- 52 Move resilient products and installation materials into spaces where they will be installed at least 48  
53 hours in advance of installation.  
54
- 55 Do not install resilient products until they are same temperature as space where they are to be  
56 installed.  
57

1 Sweep and vacuum clean substrates to be covered by resilient products immediately before  
2 installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.  
3 Proceed with installation only after unsatisfactory conditions have been corrected.

4

#### 5 INSTALLATION, GENERAL

6

7 Maintain reference markers, holes, and openings that are in place or marked for future cutting by  
8 repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, non-staining  
9 marking device.

10

11 Scribe, cut, and fit resilient flooring to butt neatly and tightly to vertical surfaces and permanent  
12 fixtures including built-in furniture, cabinets, pipes, outlets, edgings, doorframes, thresholds, and  
13 stair-nosings.

14

15 Extend flooring into toe spaces, door reveals, closets and similar openings.

16

17 Install flooring on covers for telephone and electrical ducts and similar items in finished floor areas.  
18 Maintain overall continuity of color and pattern between flooring installed on covers and adjoining  
19 flooring. Tightly adhere edges of flooring to substrates that abut covers and to cover perimeters.

20

21 Use trowelable leveling and patching compound or resilient leveler strips to provide flush surface  
22 transition from resilient flooring to adjacent floor finishes.

23

24 Adhere flooring to substrates using a full spread of adhesive applied to substrate, unless  
25 recommended otherwise by manufacturer, to produce a completed installation without open cracks,  
26 voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface  
27 imperfections.

28

29 Hand roll flooring at perimeter of each covered area to assure adhesion.

30

#### 31 SHEET FLOORING INSTALLATION

32

33 Unroll sheet flooring and allow them to stabilize before cutting and fitting.

34

35 Lay out sheet flooring as follows:

36

37 Maintain uniformity of flooring direction.

38

39 Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6  
40 inches away from parallel joints in flooring substrates.

41

42 Match edges of flooring for color shading at seams.

43

44 Avoid cross seams.

45

46 Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently  
47 fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush  
48 with adjoining flooring surfaces.

49

#### 50 RESILIENT WALL BASE INSTALLATION

51

52 Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other  
53 permanent fixtures in rooms and areas where base is required.

54

55 Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent  
56 pieces aligned.

57

1 Tightly adhere wall base to substrate throughout length of each piece, with base in continuous  
2 contact with horizontal and vertical substrates.

3

4 Do not stretch wall base during installation.

5

6 On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with  
7 manufacturer's recommended adhesive filler material.

8

9 Pre-molded Corners: Install pre-molded corners before installing straight pieces.

10

11 Job-Formed Corners (Inside Corners): Use straight pieces of maximum lengths possible. Form by  
12 cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave  
13 back of base where necessary to produce a snug fit to substrate.

14

#### 15 CLEANING AND PROTECTING

16

17 Comply with manufacturer's written instructions for cleaning and protection of floor coverings.

18

19 Perform the following operations immediately after completing resilient product installation:

20

21 Remove adhesive and other blemishes from exposed surfaces.

22

23 Sweep and vacuum surfaces thoroughly.

24

25 Damp-mop surfaces to remove marks and soil.

26

27 Do not wash surfaces until after time period recommended by manufacturer.

28

29 Protect resilient products from mars, marks, indentations, and other damage from construction  
30 operations and placement of equipment and fixtures during remainder of construction period. Use  
31 protection methods recommended in writing by manufacturer.

32

33 Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and  
34 surface blemishes if recommended in writing by manufacturer.

35

36 Cover products installed on horizontal surfaces with un-dyed, untreated building paper until  
37 Substantial Completion.

38

39 Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood  
40 panels over flooring and under objects while they are being moved. Slide or roll objects over  
41 panels without moving panels.

42

43 Clean floor surfaces not more than four days before date scheduled for inspection intended to  
44 establish date of Substantial Completion.

45

46 Clean materials: according to manufacturer's written recommendations.

47

48 Before cleaning, strip protective floor polish that was applied after completing installation  
49 only if required to restore polish finish and if recommended by flooring manufacturer.

50

51 After cleaning, reapply polish to floor surfaces to restore protective floor finish only in strict  
52 compliance with flooring manufacturer's written recommendations. Coordinate with Owner's  
53 maintenance program.

54

55

56 END OF SECTION

1     **SECTION 09 91 00 - PAINTING**

2  
3  
4     **PART 1 - GENERAL**

5  
6     **RELATED DOCUMENTS**

7  
8     Drawings and general provisions of Contract, including Construction Documents and Supplementary  
9     Conditions and Division 00 & 01 Specification Sections, apply to work of this Section.

10  
11     **SUMMARY**

12  
13     Interior painting, including:

14  
15         Surface preparation  
16         Priming  
17         Finish coats

18  
19     Definitions: "Paint" as used herein means all coating systems materials, including primers,  
20     emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime,  
21     intermediate or finish coats.

22  
23     **SUBMITTALS**

24  
25     Samples: Provide stepped samples, defining each coat, including block fillers and primers, for each  
26     color and finish. Indicate material and application method for each coat of each sample. Architect  
27     will furnish chips for colors matching if requested.

28  
29         Paint: Minimum 8-inch x 10-inch drawdown.

30  
31     **QUALITY ASSURANCE**

32  
33     Single Source Responsibility: Provide primers and other undercoat paint produced by same  
34     manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within  
35     recommended limits.

36  
37     Coordination of Work: Review other Sections of these specifications in which prime paints are to be  
38     provided to ensure compatibility of coatings systems. Upon request from other trades, furnish  
39     information on finish materials to be provided, to ensure compatible prime coats are used.

40  
41     Field Samples: Provide full coat samples on at least 100 sq. ft. of actual surfaces for each color and  
42     sheen required; simulate finished lighting conditions for review.

43  
44         Final approval of submittals will be from field samples.

45  
46         Maintain field samples during construction as a standard for judging the work.

47  
48         Approved field sample in an undisturbed condition at the time of Substantial Completion may  
49         become part of the work.

50  
51     **DELIVERY AND STORAGE**

52  
53     Deliver materials to job site in original, unopened containers bearing Manufacturer's name and label,  
54     and the following information:

55  
56         Name of material  
57         Manufacturer's stock number and date of manufacture  
58         Manufacturer's name

- 1 Contents by volume, for major pigment and vehicle constituents
- 2 Thinning instructions
- 3 Application instructions
- 4 Color name and number

5  
6 Store materials not in use in tightly covered containers. Maintain containers used for storage of paint  
7 in a clean condition, free of foreign materials and residue.

8  
9 Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily  
10 rags and waste daily. Take precautions to ensure that workmen and work areas are  
11 adequately protected from fire hazards and health hazards resulting from handling, mixing  
12 and application of paints.

#### 13 14 **JOB CONDITIONS**

15  
16 Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are  
17 between 50 and 90 deg F and can be maintained thus for a minimum of three hours after application.

18  
19 Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air  
20 are between 45 and 95 deg F.

#### 21 22 **EXTRA MATERIALS**

23  
24 Furnish an additional 5 percent, at least one gallon but not more than five gallons, of each sheen and  
25 color applied, that are from same production run (batch mix) as materials applied and that are  
26 packaged for storage and identified with labels describing contents, and identify locations applied.

#### 27 28 29 **PART 2 - PRODUCTS**

##### 30 31 **MANUFACTURERS**

32  
33 Subject to compliance with requirements, provide products indicated in Paint Schedules at end of  
34 this Section

35  
36 Proprietary names used in Materials Schedule are used to designate colors; matching colors of other  
37 listed products are acceptable.

##### 38 39 **MATERIALS**

40  
41 Chemical Components of Field-Applied Interior Paints and Coatings: Provide products that comply  
42 with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated  
43 according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions; these  
44 requirements do not apply to primers or finishes that are applied in a fabrication or finishing shop:

45  
46 Limits for VOC Content,

47  
48 Primers: Not more than 200 g/L.

49  
50 Flat Paints: Not more than 50 g/L.

51  
52 Nonflat Paints: Not more than 150 g/L.

53  
54 Dry Fall Coatings: Not more than 400 g/L.

55  
56 Stains: Not more than 550 g/L.

57  
58 Clear Finishes: Not more than 730 g/L.

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Chemical Restrictions:

Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

Restricted Components: Paints and coatings shall not contain any of the following:

Acrolein.  
Acrylonitrile.  
Antimony.  
Benzene.  
Butyl benzyl phthalate.  
Cadmium.  
Di (2-ethylhexyl) phthalate.  
Di-n-butyl phthalate.  
Di-n-octyl phthalate.  
1,2-dichlorobenzene.  
Diethyl phthalate.  
Dimethyl phthalate.  
Ethylbenzene.  
Formaldehyde.  
Hexavalent chromium.  
Isophorone.  
Lead.  
Mercury.  
Methyl ethyl ketone.  
Methyl isobutyl ketone.  
Methylene chloride.  
Naphthalene.  
Toluene (methylbenzene).  
1,1,1-trichloroethane.  
Vinyl chloride.

**PART 3 - EXECUTION**

**INSPECTION**

Examine substrates, areas and conditions under which painting work is to be applied. Notify Architect in writing of conditions detrimental to proper and timely completion of work.

Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

Do not proceed with work until unsatisfactory conditions have been corrected and are acceptable to Painting Contractor. Starting of painting work will be construed as Contractor's acceptance of surfaces and conditions.

Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces or conditions otherwise detrimental to formation of a durable paint film.

**SURFACE PREPARATION**

Perform preparation and cleaning procedures in accordance with paint Manufacturer's instructions and as herein specified, for each substrate condition.

1  
2 Remove hardware, hardware accessories, machined surfaces, outlet plates, lighting fixtures and  
3 similar items in place and not to be finish painted, or provide surface applied protection prior to  
4 surface preparation and painting operations. Following completion of painting of each space or area,  
5 reinstall removed items.

6  
7 Clean surfaces to be painted. Remove paper labels, including adhesives. Remove oil and grease  
8 prior to mechanical cleaning. Program cleaning and painting so that contaminants from cleaning  
9 process will not fall onto wet, newly painted surfaces.

10  
11 Provide barrier coats over incompatible primers or remove and re-prime. Notify Architect in writing of  
12 anticipated problems in using the specified coating systems over shop or factory primed surfaces.

13  
14 Wood: Clean wood surfaces to be painted of dirt, oil or other foreign substances with scrapers,  
15 mineral spirits and sandpaper, as required. Sandpaper smooth those finished surfaces exposed to  
16 view and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white  
17 shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes  
18 and imperfections in finish surfaces with putty or plastic wood filler; sandpaper smooth when dried.

19  
20 Prime, stain or seal wood required to be job painted immediately upon delivery to job. Prime  
21 edges, ends, faces, undersides and backsides of such wood, including cabinets, counters,  
22 cases, paneling.

23  
24 When transparent finish is required, use spar varnish for back priming.

25  
26 Seal unfinished tops, bottoms and cutouts of wood doors with a heavy coat of varnish or  
27 equivalent sealer immediately upon delivery to job.

28  
29 Ferrous Metals: Clean ferrous surfaces which are not galvanized or shop coated, of oil, grease, dirt,  
30 loose mill scale and other foreign substances by solvent or mechanical methods.

31  
32 Touch up shop applied prime coats wherever damaged or bare with same type shop primer.

33  
34 Galvanized Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.  
35 Rinse thoroughly and allow to dry.

36  
37 MATERIALS PREPARATION

38  
39 Mix and prepare painting materials in accordance with manufacturer's directions.

40  
41 Maintain containers used in mixing and application of paint in a clean condition, free of foreign  
42 materials and residue.

43  
44 Stir materials before application to produce a mixture of uniform density, and stir as required during  
45 application. Do not stir surface film into material. Remove film and if necessary, strain material  
46 before using.

47  
48 APPLICATION

49  
50 General: Apply paint in accordance with Manufacturer's directions. Use applicators and techniques  
51 best suited for substrate and type of material being applied.

52  
53 Provide finish coats compatible with prime paints used.

54  
55 Apply additional coat(s) when undercoats, stains or other conditions show through final coat  
56 of paint, until paint film is of uniform finish, color and appearance. Give special attention to  
57 ensure that surfaces, including edges, corners, crevices, welds and exposed fasteners  
58 receive a dry film thickness equivalent to that of flat surfaces.

- 1  
2 Sand lightly between each succeeding enamel or varnish coat.  
3  
4 Omit primer on metal surfaces that have been shop primed and touch up painted, unless  
5 otherwise indicated.  
6  
7 Scheduling Painting: Apply first coat material to surfaces that have been cleaned, pretreated or  
8 otherwise prepared for painting as soon as practicable after preparation and before subsequent  
9 surface deterioration.  
10  
11 Allow sufficient time between successive coatings to permit proper drying. Do not recoat  
12 until paint has dried to where it feels firms, does not deform or feel sticky under moderate  
13 thumb pressure and application of another coat of paint does not cause lifting or loss of  
14 adhesion of the undercoat.  
15  
16 Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended  
17 spreading rate to establish a total dry film thickness as recommended by coating manufacturer.  
18  
19 Prime Coats: Apply prime coat to surfaces which are required to be painted and which have not  
20 been prime coated.  
21  
22 Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed  
23 areas in first coat, to assure a finish coat with no burn through or other defects due to  
24 insufficient sealing.  
25  
26 Opaque Finishes: Completely cover to provide a smooth surface of uniform finish, color, appearance  
27 and coverage. Cloudiness, spotting, holidays, brush marks, runs, sags, ropiness or other surface  
28 imperfections will not be acceptable.  
29  
30 Roller Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of  
31 rolling such as laps, irregularity in texture, skid marks or other surface imperfections.  
32  
33 Transparent Finish: Use multiple coats to produce glass smooth surface film of even luster. Provide  
34 a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes or other  
35 surface imperfections.  
36  
37 Provide satin finish for final coats, unless otherwise indicated.  
38  
39 Completed Work: Match approved Field Samples for color, texture and coverage. Remove, refinish  
40 or repaint work not in compliance with specified requirements.  
41  
42 EXTENT OF PAINTING  
43  
44 Except mechanical and electrical work and where self-finished or pre-finished materials are  
45 indicated, paint exposed surfaces., Paint non-scheduled surfaces the same as similar adjacent  
46 surfaces. Where color or finish requirements are unclear, request clarification from Architect.  
47  
48 Include field painting of steel, including doors, frames, lintels, railings and stairs, access  
49 panels, fire extinguisher cabinets, grilles and vents, and primed metal surfaces of equipment,  
50 except where otherwise indicated.  
51  
52 Paint surfaces behind movable equipment and furniture same as similar exposed surfaces.  
53  
54 Paint surfaces behind permanently fixed equipment and casework with prime coat only  
55 before final installation of equipment.  
56  
57 Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless  
58 otherwise indicated.

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Do not paint the following:

Concealed Surfaces: spaces above ceilings,

Finished Metal Surfaces: anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials.

Code required labels, such as Underwriters' Laboratories and Factory Mutual, or other equipment identification, performance rating, name or nomenclature plates.

Operating Parts: moving parts of operating units, mechanical and electrical components such as valve and damper operators, linkages, sensing devices, motor and fan shafts.

#### FIELD QUALITY CONTROL

Owner and Architect reserve the right to use the following material testing procedure at any time, and any number of times during period of field painting:

Owner will engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed and certified in presence of Contractor.

Testing laboratory will perform appropriate tests for any or all of following characteristics: Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, color retention, alkali resistance and quantitative materials analysis.

Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove non-complying paint from Project site, pay for testing, and repaint surfaces previously coated with the non-complying paint. If necessary, Contractor may be required to remove non-complying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible

#### CLEAN UP AND PROTECTION

Clean Up: During progress of work, remove from site discarded painted materials, rubbish, cans and rags at end of each workday.

Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage the finished surfaces.

Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing and repainting, as acceptable to Architect.

Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.

At completion of work of other trades, touch up and restore damaged or defaced painted surfaces.

1 **INTERIOR PAINT SCHEDULE**

2

3 **WALLS AND CEILINGS**

4

5 Primer for gypsum board; one coat:

6

7	Benjamin Moore	023 Fresh Start 100% Acrylic Primer
8	Diamond Vogel	DU-1590 Healthcote Zero VOC Interior PVA Primer/Sealer
9	Hallman/Lindsay	221 Earthscapes Zero-VOC Latex Wall Primer
10	Glidden Professional	LM116 Prep & Prime Interior Water-Based Primer-Sealer
11	Pittsburgh Paints	9-900 Pure Performance Interior Latex Primer r
12	Sherwin-Williams	B11W900 Harmony Interior Latex Primer

13

14 Primer–sealer for gypsum board where epoxy

15

16	Benjamin Moore	253 Super Spec Latex Enamel Undercoater & Primer Sealer
17	Diamond Vogel	DU-1507 Interior PVA Primer/Sealer
18	Hallman/Lindsay	220 Wonder Kote Latex Wall Primer
19	Glidden Professional	3210 Ultra-Hide “Gripper” Aquacrylic Primer - Sealer
20	Pittsburgh Paints	6-2 Speedhide Quick Drying Interior Latex Primer sealer
21	Sherwin-Williams Co	Pre Rite Classic Primer B28U100

22

23 Flat Finish

24

25	Benjamin Moore	219 Eco Spec Latex Flat
26	Diamond Vogel	DF-1591 Health Cote Interior Latex Flat
27	Hallman/Lindsay	261 Earthscapes Latex Flat Wall Paint
28	Glidden Professional	9100 Dulux Lifemaster Flat Interior Latex Enamel
29	Pittsburgh Paints	9-100 Pure Performance Interior Flat Latex
30	Sherwin-Williams	BR Series Harmony Interior Latex Flat

31

32 Eggshell Finish

33

34	Benjamin Moore.	274 Moorcraft Super Spec Latex Eggshell Enamel
35	Diamond Vogel	DE-Series Pro Plus Interior Latex Eggshell Enamel
36	Hallman Lindsay	284 Pro Kote Latex Eggshell Enamel
37	Glidden Professional	1412 Glidden Ultra-Hide Latex Eggshell Wall and Trim Enamel
38	Pittsburgh Paints	6-411 Speedhide Interior Enamel Eggshell Latex
39	Sherwin-Williams	B20W2200 ProMar 200 Interior Latex Eg-Shel

40

41 Satin finish

42

43	Benjamin Moore	310 Regal AquaPearl
44	Diamond Vogel	DS-Series Pro Plus Interior Latex Semi-Gloss Enamel
45	Hallman Lindsay	294 Pro Kote Latex Satin Enamel
46	Glidden Professional	1414 Ultra-Hide Latex Low-Lustre Enamel
47	Pittsburgh Paints	80-510 Wallhide Interior Semi-Gloss Acrylic Latex
48	Sherwin-Williams	B31W2200 ProMar 200 Interior Latex Semi-Gloss

49

50 Semi-Gloss finish

51

52	Benjamin Moore	276 Moorcraft Super Spec Latex Semi-Gloss Enamel
53	Diamond Vogel	DH-Series Pro Plus Interior Gloss Latex Enamel
54	Hallman Lindsay	296 Pro Kote Latex Semi-Gloss Enamel
55	Glidden Professional	1416 Glidden Ultra-Hide Interior Latex Semi-Gloss Enamel
56	Pittsburgh Paints	6-500 Speedhide Interior Semi-Gloss Acrylic Latex
57	Sherwin-Williams	B31W2200 ProMar 200 Interior Latex Semi-Gloss

58

- 1 Epoxy Finish
- 2
- 3 Benjamin Moore & Co 256 Moorcraft Super Spec Acrylic Epoxy w/ 256-86 Epoxy Catalyst
- 4 Diamond Vogel Paints MC-1245/1246 Aqua Pox Waterborne Epoxy 4/ MF-0245 Activator
- 5 Glidden Professional 4406 Tru-Glaze-WB
- 6 Mautz Paint Co. 962 Hydro-Glaze Water Based Epoxy - Satin Finish
- 7 Pittsburgh Paints 16-551/16599 Pitt-Glaze WB Water Borne Acrylic Epoxy Semi-Gloss
- 8 Sherwin-Williams Co B70-200 Series Water Based Catalyzed Epoxy
- 9
- 10
- 11 END OF SECTION

1     **SECTION 26 05 00 - BASIC ELECTRICAL REQUIREMENTS**

2     **PART 1 - GENERAL**

3     1.1     SECTION INCLUDES

4             A.     Requirements applicable to all Division 26 Sections. Also refer to Division 01 - Basic  
5                     Requirements. This section is also applicable to Fire Alarm and Detection Systems  
6                     Section 28 31 00.

7             B.     All materials and installation methods shall conform to the applicable standards,  
8                     guidelines and codes referenced in each specification section.

9     1.2     SCOPE OF WORK

10            A.     This Specification and the associated drawings govern furnishing, installing, testing  
11                    and placing into satisfactory operation the Electrical Systems.

12            B.     The Contractor shall furnish and install all new materials as indicated on the  
13                    drawings, and/or in these specifications, and all items required to make his portion of  
14                    the Electrical Work a finished and working system.

15            C.     Description of Systems shall be as follows:

16                    1.     Electrical power system to and including equipment, devices, etc.

17                    2.     Fire alarm system.

18                    3.     Nurse call system.

19                    4.     Security system.

20                    5.     Wiring of equipment furnished by others.

21                    6.     Removal work and/or relocation and reuse of existing systems and  
22                    equipment.

23                    7.     Technology Systems as described in Division 28 and on the T-series  
24                    documents.

25     1.3     OWNER FURNISHED PRODUCTS

26             A.     The Owner will supply manufacturer's installation data for new equipment purchased  
27                     by him for this project.

28             B.     This Contractor shall make all electrical system connections shown on the drawings  
29                     or required for fully functional units.

30             C.     This Contractor is responsible for all damage to Owner furnished equipment caused  
31                     during installation.

32     1.4     WORK SEQUENCE

33             A.     All work that will produce excessive noise or interference with normal building  
34                     operations, as determined by the Owner, shall be scheduled with the Owner. It may  
35                     be necessary to schedule such work during unoccupied hours. The Owner reserves  
36                     the right to determine when restricted construction hours are required.

- 1 1.5 DIVISION OF WORK BETWEEN ELECTRICAL AND TECHNOLOGY CONTRACTORS
- 2 A. Division of work is the responsibility of the Prime Contractor. Any scope of work  
3 described at any location on the contract document shall be sufficient for including  
4 said requirement in the project. The Prime Contractor shall be solely responsible for  
5 determining the appropriate subcontractor for the described scope. In no case shall  
6 the project be assessed an additional cost for scope that is described on the  
7 contract documents on bid day. The following division of responsibility is a guideline  
8 based on typical industry practice.
- 9 B. Definitions:
- 10 1. "Technology Contractors" refers to the Contractors furnishing and installing  
11 systems listed in Division 28 of this Specification.
- 12 2. Low Voltage Technology Wiring: The wiring associated with the Technology  
13 Systems, used for analog or digital signals between equipment.
- 14 3. Telecommunications Rough-in: Relates specifically to the backboxes,  
15 necessary plaster rings and other miscellaneous hardware required for the  
16 installation or mounting of telecommunications information outlets.
- 17 C. General (Electrical/Technology):
- 18 1. The purpose of these Specifications is to outline the Electrical and  
19 Technology Contractor's work responsibilities as related to  
20 Telecommunications Rough-in, conduit, cable tray, power wiring and Low  
21 Voltage Technology Wiring.
- 22 2. The exact wiring requirements for much of the equipment cannot be  
23 determined until the systems have been purchased and submittals  
24 approved. Therefore, only known wiring, conduits, raceways and electrical  
25 power related to such items is shown on the Technology drawings. Other  
26 wiring, conduits, raceways, junction boxes and electrical power not shown  
27 on the Technology Drawings but required for operation of the systems is the  
28 responsibility of the Technology Contractor and included in said Contractor's  
29 bid.
- 30 3. Where the Electrical Contractor is required to install conduit, conduit sleeves  
31 and/or power connections in support of Technology systems, the final  
32 installation shall not be until a coordination meeting between the Electrical  
33 Contractor and the Technology Contractor has convened to determine the  
34 exact location and requirements of the installation.
- 35 4. Where the Electrical Contractor is required to install cable tray that will  
36 contain Low Voltage Technology Wiring, installation shall not begin prior to a  
37 coordination review of the cable tray shop drawings by the Technology  
38 Contractor.
- 39 D. Technology Contractor's Responsibility:
- 40 1. Assumes all responsibility for the Low Voltage Technology Wiring of all  
41 systems, including cable support where open cable is specified.
- 42 2. Assumes all responsibility for all required backboxes, conduit and power  
43 connections not specifically shown as being furnished and installed by the  
44 Electrical Contractor on the "Suggested Matrix of Scope Responsibility".

- 1 3. Assumes all responsibility for providing and installing all ladder rack and  
2 other cable management hardware (as defined in here-in).
- 3 4. Responsible for providing the Electrical Contractor with the required  
4 grounding lugs or other hardware for each piece of Technology equipment  
5 which is required to be bonded to the telecommunications ground bar.
- 6 5. This Contractor is responsible for coordination of utilities with all other  
7 Contractors. If any field coordination conflicts are found, the Contractor shall  
8 coordinate with other Contractors to determine a viable layout.

9 1.6 QUALITY ASSURANCE

10 A. Contractor's Responsibility Prior to Submitting Pricing/Bid Data:

- 11 1. The Contractor is responsible for constructing complete and operating  
12 systems. The Contractor acknowledges and understands that the Contract  
13 Documents are a two-dimensional representation of a three-dimensional  
14 object, subject to human interpretation. This representation may include  
15 imperfect data, interpreted codes, utility guides, three-dimensional conflicts,  
16 and required field coordination items. Such deficiencies can be corrected  
17 when identified prior to ordering material and starting installation. The  
18 Contractor agrees to carefully study and compare the individual Contract  
19 Documents and report at once in writing to the Architect/Engineer any  
20 deficiencies the Contractor may discover. The Contractor further agrees to  
21 require each subcontractor to likewise study the documents and report at  
22 once any deficiencies discovered.
- 23 2. The Contractor shall resolve all reported deficiencies with the  
24 Architect/Engineer prior to awarding any subcontracts, ordering material, or  
25 starting any work with the Contractor's own employees. Any work performed  
26 prior to receipt of instructions from the Architect/Engineer will be done at the  
27 Contractor's risk.

28 B. Qualifications:

- 29 1. Only products of reputable manufacturers as determined by the  
30 Architect/Engineer are acceptable.
- 31 2. All Contractors and subcontractors shall employ only workmen who are  
32 skilled in their trades. At all times, the number of apprentices at the job site  
33 shall be less than or equal to the number of journeymen at the job site.

34 C. Compliance with Codes, Laws, Ordinances:

- 35 1. Conform to all requirements of the State of Wisconsin and Town of Verona  
36 Codes, Laws, Ordinances and other regulations having jurisdiction over this  
37 installation.
- 38 2. If there is a discrepancy between the codes and regulations and these  
39 specifications, the Architect/Engineer shall determine the method or  
40 equipment used.
- 41 3. If the Contractor notes, at the time of bidding, any parts of the drawings or  
42 specifications that do not comply with the codes or regulations, he shall  
43 inform the Architect/Engineer in writing, requesting a clarification. If there is  
44 insufficient time for this procedure, he shall submit with his proposal a  
45 separate price to make the system comply with the codes and regulations.

- 1 4. All changes to the system made after the letting of the contract to comply  
2 with codes or the requirements of the Inspector, shall be made by the  
3 Contractor without cost to the Owner.
- 4 5. If there is a discrepancy between manufacturer's recommendations and  
5 these specifications, the manufacturer's recommendations shall govern.
- 6 6. If there are no local codes having jurisdiction, the current issue of the  
7 National Electrical Code shall be followed.
- 8 D. Permits, Fees, Taxes, Inspections:
- 9 1. Procure all applicable permits and licenses.
- 10 2. Abide by all laws, regulations, ordinances, and other rules of the State or  
11 Political Subdivision where the work is done, or as required by any duly  
12 constituted public authority.
- 13 3. Pay all charges for permits or licenses.
- 14 4. Pay all fees and taxes imposed by State, Municipal, and other regulatory  
15 bodies.
- 16 5. Pay all charges arising out of required inspections by an authorized body.
- 17 6. Pay all charges arising out of required contract document reviews  
18 associated with the project and as initiated by the Owner or authorized  
19 agency/consultant.
- 20 7. Where applicable, all fixtures, equipment and materials shall be listed by  
21 Underwriter's Laboratories, Inc. or a nationally recognized testing  
22 organization.
- 23 8. Pay all telephone company charges related to the service or change in  
24 service.
- 25 E. Examination of Drawings:
- 26 1. The drawings for the electrical work are completely diagrammatic, intended  
27 to convey the scope of the work and to indicate the general arrangements  
28 and locations of equipment, outlets, etc., and the approximate sizes of  
29 equipment.
- 30 2. Contractor shall determine the exact locations of equipment and rough-ins,  
31 and the exact routing of raceways so as to best fit the layout of the job.
- 32 3. Scaling of the drawings will not be sufficient or accurate for determining  
33 these locations.
- 34 4. Where job conditions require reasonable changes in arrangements and  
35 locations, such changes shall be made by the Contractor at no additional  
36 cost to the Owner.
- 37 5. Because of the scale of the drawings, certain basic items, such as junction  
38 boxes, pull boxes, conduit fittings, etc., may not be shown, but where  
39 required by other sections of the specifications or required for proper  
40 installation of the work, such items shall be furnished and installed.

- 1 6. If an item is either shown on the drawings or called for in the specifications,  
2 it shall be included in this contract.
- 3 7. The Contractor shall determine quantities and quality of material and  
4 equipment required from the documents. Where discrepancies arise  
5 between drawings, schedules and/or specifications, the greater and better  
6 quality number shall govern.
- 7 8. Where used in electrical documents the word "furnish" shall mean supply for  
8 use, the word "install" shall mean connect up complete and ready for  
9 operation, and the word "provide" shall mean to supply for use and connect  
10 up complete and ready for operation.
- 11 9. Any item listed as furnished shall also be installed unless otherwise noted.
- 12 10. Any item listed as installed shall also be furnished unless otherwise noted.
- 13 F. Electronic Media/Files:
- 14 1. Construction drawings for this project have been prepared utilizing  
15 AutoCAD MEP.
- 16 2. Contractors and Subcontractors may request electronic media files of the  
17 contract drawings and/or copies of the specifications. Specifications will be  
18 provided in PDF format.
- 19 3. Upon request for electronic media, the Contractor shall complete and return  
20 a signed "Electronic File Transmittal" form provided by KJWW.
- 21 4. If the information requested includes floor plans prepared by others, the  
22 Contractor will be responsible for obtaining approval from the appropriate  
23 Design Professional for use of that part of the document.
- 24 5. The electronic contract documents can be used for preparation of shop  
25 drawings and as-built drawings only. The information may not be used in  
26 whole or in part for any other project.
- 27 6. The drawings prepared by KJWW for bidding purposes may not be used  
28 directly for ductwork layout drawings or coordination drawings.
- 29 7. The use of these CAD documents by the Contractor does not relieve them  
30 from their responsibility for coordination of work with other trades and  
31 verification of space available for the installation.
- 32 8. The information is provided to expedite the project and assist the Contractor  
33 with no guarantee by KJWW as to the accuracy or correctness of the  
34 information provided. KJWW accepts no responsibility or liability for the  
35 Contractor's use of these documents.
- 36 G. Field Measurements:
- 37 1. Verify all pertinent dimensions at the job site before ordering any conduit,  
38 conductors, wireways, bus duct, fittings, etc.

39 1.7 SUBMITTALS

- 40 A. Submittals shall be required for the following items, and for additional items where  
41 required elsewhere in the specifications or on the drawings.

1 1. Submittals list:

**Referenced Specification Section**

28 31 00

**Submittal Item**

Fire Alarm and Detection Systems

2 A. General Submittal Procedures: In addition to the provisions of Division 1, the  
3 following are required:

4 1. Transmittal: Each transmittal shall include the following:

- 5 a. Date
- 6 b. Owner's Project title and number
- 7 c. Contractor's name and address
- 8 d. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
- 9 e. Description of items submitted and relevant specification number
- 10 f. Notations of deviations from the contract documents
- 11 g. Other pertinent data

12 2. Submittal Cover Sheet: Each submittal shall include a cover sheet  
13 containing:

- 14 a. Date
- 15 b. Owner's Project title and number
- 16 c. Architect/Engineer
- 17 d. Contractor and subcontractors' names and addresses
- 18 e. Supplier and manufacturer's names and addresses
- 19 f. Division of work (e.g., electrical, plumbing, heating, ventilating, etc.)
- 20 g. Description of item submitted (using project nomenclature) and  
21 relevant specification number
- 22 h. Notations of deviations from the contract documents
- 23 i. Other pertinent data
- 24 j. Provide space for Contractor's review stamps

25 3. Composition:

- 26 a. Submittals shall be submitted using specification sections and the  
27 project nomenclature for each item.
- 28 b. Individual submittal packages shall be prepared for items in each  
29 specification section. All items within a single specification section  
30 shall be packaged together where possible. An individual submittal  
31 may contain items from multiple specifications sections if the items  
32 are intimately linked (e.g., pumps and motors).
- 33 c. All sets shall contain an index of the items enclosed with a general  
34 topic description on the cover.

35 4. Content: Submittals shall include all fabrication, erection, layout, and setting  
36 drawings; manufacturers' standard drawings; schedules; descriptive  
37 literature, catalogs and brochures; performance and test data; wiring and  
38 control diagrams; dimensions; shopping and operating weights; shipping  
39 splits; service clearances; and all other drawings and descriptive data of  
40 materials of construction as may be required to show that the materials,  
41 equipment or systems and the location thereof conform to the requirements  
42 of the contract documents.

- 1                   5.     Contractor's Approval Stamp:
- 2                   a.     The Contractor shall thoroughly review and approve all shop  
3                   drawings before submitting them to the Architect/Engineer. The  
4                   Contractor shall stamp, date and sign each submittal certifying it has  
5                   been reviewed.
- 6                   b.     Unstamped submittals will be rejected.
- 7                   c.     The Contractor's review shall include, but not be limited to,  
8                   verification of the following:
- 9                             1)     Only approved manufacturers are used.  
10                            2)     Addenda items have been incorporated.  
11                            3)     Catalog numbers and options match those specified.  
12                            4)     Performance data matches that specified.  
13                            5)     Electrical characteristics and loads match those specified.  
14                            6)     Equipment connection locations, sizes, capacities, etc. have  
15                            been coordinated with other affected trades.  
16                            7)     Dimensions and service clearances are suitable for the  
17                            intended location.  
18                            8)     Equipment dimensions are coordinated with support steel,  
19                            housekeeping pads, openings, etc.  
20                            9)     Constructability issues are resolved (e.g., weights and  
21                            dimensions are suitable for getting the item into the building  
22                            and into place, sinks fit into countertops, etc.).
- 23                   d.     The Contractor shall review, stamp and approve all subcontractors'  
24                   submittals as described above.
- 25                   e.     **The Contractor's approval stamp is required on all submittals.**  
26                   **Approval will indicate the Contractor's review of all material**  
27                   **and a complete understanding of exactly what is to be**  
28                   **furnished. Contractor shall clearly mark all deviations from the**  
29                   **contract documents on all submittals. If deviations are not**  
30                   **marked by the Contractor, then the item shall be required to**  
31                   **meet all drawing and specification requirements.**
- 32                   6.     Submittal Identification and Markings:
- 33                   a.     The Contractor shall clearly mark each item with the same  
34                   nomenclature applied on the drawings or in the specifications.
- 35                   b.     The Contractor shall clearly indicate the size, finish, material, etc.
- 36                   c.     Where more than one model is shown on a manufacturer's sheet,  
37                   the Contractor shall clearly indicate exactly which item and which  
38                   data is intended.
- 39                   d.     All marks and identifications on the submittals shall be  
40                   unambiguous.
- 41                   7.     Schedule submittals to expedite the project. Coordinate submission of  
42                   related items.
- 43                   8.     Identify variations from the contract documents and product or system  
44                   limitations that may be detrimental to the successful performance of the  
45                   completed work.

- 1 9. Reproduction of contract documents alone is not acceptable for submittals.
- 2 10. Incomplete submittals will be rejected without review. Partial submittals will  
3 only be reviewed with prior approval from the Architect/Engineer.
- 4 11. Submittals not required by the contract documents may be returned without  
5 review.
- 6 12. The Architect/Engineer's responsibility shall be to review one set of shop  
7 drawing submittals for each product. If the first submittal is incomplete or  
8 does not comply with the drawings and/or specifications, the Contractor  
9 shall be responsible to bear the cost for the Architect/Engineer to recheck  
10 and handle the additional shop drawing submittals.
- 11 13. Submittals shall be reviewed and approved by the Architect/Engineer  
12 **before** releasing any equipment for manufacture or shipment.
- 13 14. Contractor's responsibility for errors, omissions or deviation from the  
14 contract documents in submittals is not relieved by the Architect/Engineer's  
15 approval.
- 16 B. Electronic Submittal Procedures:
- 17 1. Distribution: Email submittals as attachments to all parties designated by the  
18 Architect/Engineer, unless a web-based submittal program is used.
- 19 2. Transmittals: Each submittal shall include an individual electronic letter of  
20 transmittal.
- 21 3. Format: Electronic submittals shall be in PDF format only. Scanned copies,  
22 in PDF format, of paper originals are acceptable. Submittals that are not  
23 legible will be rejected. Do not set any permission restrictions on files;  
24 protected, locked, or secured documents will be rejected.
- 25 4. File Names: Electronic submittal file names shall include the relevant  
26 specification section number followed by a description of the item submitted,  
27 as follows. Where possible, include the transmittal as the first page of the  
28 PDF instead of using multiple electronic files.
- 29 a. Submittal file name: 26 XX XX.description.YYYYMMDD  
30 b. Transmittal file name: 26 XX XX.description.YYYYMMDD
- 31 5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger  
32 files shall be transmitted via a pre-approved method.

### 33 1.8 SCHEDULE OF VALUES

34 A. The requirements herein are in addition to the provisions of Division 1.

35 B. Format:

- 36 1. Use AIA Document Continuation Sheets G703 or another similar form  
37 approved by the Owner and Architect/Engineer.
- 38 2. Submit in Excel format.
- 39 3. Support values given with substantiating data.

- 1 C. Preparation:
- 2 1. Itemize the cost for each of the following:
- 3 a. Overhead and profit.
- 4 b. Bonds.
- 5 c. Insurance.
- 6 d. General Requirements: Itemize all requirements.
- 7 2. Itemize work required by each specification section and list all providers. All
- 8 work provided by subcontractors and major suppliers shall be listed on the
- 9 Schedule of Values. List each subcontractor and supplier by company
- 10 name.
- 11 a. Contractor's own labor forces.
- 12 b. All subcontractors.
- 13 c. All major suppliers of products or equipment.
- 14 3. Break down all costs into:
- 15 a. Material: Delivered cost of product with taxes paid.
- 16 b. Labor: Labor cost, excluding overhead and profit.
- 17 4. For each line item having an installed cost of more than \$5,000, break down
- 18 costs to list major products or operations under each item. At a minimum,
- 19 provide material and labor cost line items for the following:
- 20 a. Each piece of equipment requiring shop drawings. Use the
- 21 equipment nomenclature (SB-1, PANEL P-1, etc.) on the Schedule
- 22 of Values.
- 23 b. Each type of small unitary equipment (e.g., FDS, FCS, CS, etc.).
- 24 Multiple units of the same type can be listed together provided
- 25 quantities are also listed so unit costs can be determined.
- 26 c. Each conduit system (medium voltage, normal, emergency, low
- 27 voltage systems, etc.). In addition, for larger projects breakdown the
- 28 material and labor for each conduit system based on geography
- 29 (building, floor, and/or wing).
- 30 d. Fire alarm broken down into material and labor for the following:
- 31 1) Engineering
- 32 2) Controllers, devices, sensors, etc.
- 33 3) Conduit
- 34 4) Wiring
- 35 5) Programming
- 36 6) Commissioning
- 37 e. Site utilities (5' beyond building)
- 38 f. Seismic design
- 39 g. Testing
- 40 h. Commissioning
- 41 i. Record drawings
- 42 j. Punchlist and closeout
- 43 D. Update Schedule of Values when:
- 44 1. Indicated by Architect/Engineer.
- 45 2. Change of subcontractor or supplier occurs.
- 46 3. Change of product or equipment occurs.

- 1 1.9 CHANGE ORDERS
- 2 A. A detailed material and labor takeoff shall be prepared for each change order, along  
3 with labor rates and markup percentages. Change orders with inadequate  
4 breakdown will be rejected.
- 5 B. Change order work shall not proceed until authorized.
- 6 1.10 PRODUCT DELIVERY, STORAGE, HANDLING AND MAINTENANCE
- 7 A. Exercise care in transporting and handling to avoid damage to materials. Store  
8 materials on the site to prevent damage.
- 9 B. Keep all materials clean, dry and free from damaging environments.
- 10 C. Coordinate the installation of heavy and large equipment with the General  
11 Contractor and/or Owner. If the Electrical Contractor does not have prior  
12 documented experience in rigging and lifting similar equipment, he/she shall contract  
13 with a qualified lifting and rigging service that has similar documented experience.  
14 Follow all equipment lifting and support guidelines for handling and moving.
- 15 D. Contractor is responsible for moving equipment into the building and/or site.  
16 Contractor shall review site prior to bid for path locations and any required building  
17 modifications to allow movement of equipment. Contractor shall coordinate his/her  
18 work with other trades.
- 19 1.11 WARRANTY
- 20 A. Provide one-year warranty for all fixtures, equipment, materials, and workmanship.
- 21 B. The warranty period for all work in this specification Division shall commence on the  
22 date of Substantial Completion or successful system performance whichever occurs  
23 later. The warranty may also commence if a whole or partial system or any separate  
24 piece of equipment or component is put into use for the benefit of any party other  
25 than the installing contractor with prior written authorization of the Owner. In this  
26 instance, the warranty period shall commence on the date when such whole system,  
27 partial system or separate piece of equipment or component is placed in operation  
28 and accepted in writing by the Owner.
- 29 C. Warranty requirements extend to correction, without cost to the Owner, of all work  
30 found to be defective or nonconforming to the contract documents. The Contractor  
31 shall bear the cost of correcting all damage due to defects or nonconformance with  
32 contract documents excluding repairs required as a result of improper maintenance  
33 or operation, or of normal wear as determined by the Architect/Engineer.
- 34 1.12 INSURANCE
- 35 A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these  
36 specifications.
- 37 1.13 MATERIAL SUBSTITUTION
- 38 A. Where several manufacturers' names are given, the manufacturer for which a  
39 catalog number is given is the basis of design and establishes the quality required.

- 1 B. Equivalent equipment manufactured by the other named manufacturers may be  
2 used. Contractor shall ensure that all items submitted by these other manufacturers  
3 meet all requirements of the drawings and specifications, and fit in the allocated  
4 space. The Architect/Engineer shall make the final determination of whether a  
5 product is equivalent.
- 6 C. Any material, article or equipment of other unnamed manufacturers which will  
7 adequately perform the services and duties imposed by the design and is of a  
8 quality equal to or better than the material, article or equipment identified by the  
9 drawings and specifications may be used if approval is secured in writing from the  
10 Architect/Engineer via addendum. The Contractor assumes all costs incurred as a  
11 result of using the offered material, article or equipment, on his part or on the part of  
12 other Contractors whose work is affected.
- 13 D. Voluntary add or deduct prices for alternate materials may be listed on the bid form.  
14 These items will not be used in determining the low bidder. This Contractor assumes  
15 all costs incurred as a result of using the offered material or equipment on his part or  
16 on the part of other Contractors whose work is affected.
- 17 E. All material substitutions requested after the final addendum must be listed as  
18 voluntary changes on the bid form.

## 19 **PART 2 - PRODUCTS**

### 20 2.1 GENERAL

- 21 A. All items of material having a similar function (e.g., safety switches, panelboards,  
22 switchboards, contactors, motor starters, dry type transformers) shall be of the same  
23 manufacturer unless specifically stated otherwise on drawings or elsewhere in  
24 specifications.

## 25 **PART 3 - EXECUTION**

### 26 3.1 JOBSITE SAFETY

- 27 A. Neither the professional activities of the Architect/Engineer, nor the presence of the  
28 Architect/Engineer or his or her employees and subconsultants at a construction  
29 site, shall relieve the Contractor and any other entity of their obligations, duties and  
30 responsibilities including, but not limited to, construction means, methods,  
31 sequence, techniques or procedures necessary for performing, superintending or  
32 coordinating all portions of the work of construction in accordance with the contract  
33 documents and any health or safety precautions required by any regulatory  
34 agencies. The Architect/Engineer and his or her personnel have no authority to  
35 exercise any control over any construction contractor or other entity or their  
36 employees in connection with their work or any health or safety precautions. The  
37 Contractor is solely responsible for jobsite safety. The Architect/Engineer and the  
38 Architect/Engineer's consultants shall be indemnified and shall be made additional  
39 insureds under the Contractor's general liability insurance policy.

### 40 3.2 ARCHITECT/ENGINEER OBSERVATION OF WORK

- 41 A. The contractor shall provide seven (7) calendar days' notice to the  
42 Architect/Engineer prior to:
- 43 1. Covering exterior walls, interior partitions and chases.
  - 44 2. Installing hard or suspended ceilings and soffits.

- 1 B. The Architect/Engineer will review the installation and provide a written report noting  
2 deficiencies requiring correction. The contractor's schedule shall account for these  
3 reviews and show them as line items in the approved schedule.
- 4 C. Above-Ceiling Final Observation:
- 5 1. All work above the ceilings must be complete prior to the  
6 Architect/Engineer's review. This includes, but is not limited to:
- 7 a. All junction boxes are closed and identified in accordance with  
8 Section 26 05 53 Electrical Identification.
- 9 b. All wall penetrations have been sealed.
- 10 2. In order to prevent the Above-Ceiling Final Observation from occurring too  
11 early, the Contractor shall review the status of the work and certify, in  
12 writing, that the work is ready for the Above-Ceiling Final Observation.
- 13 3. It is understood that if the Architect/Engineer finds the ceilings have been  
14 installed prior to this review and prior to seven days elapsing, the  
15 Architect/Engineer may not recommend further payments to the contractor  
16 until such time as full access has been provided.

17 3.3 PROJECT CLOSEOUT

- 18 A. The following paragraphs supplement the requirements of Division 1.
- 19 B. Final Jobsite Observation:
- 20 1. In order to prevent the Final Jobsite Observation from occurring too early,  
21 the Contractor shall review the completion status of the project and certify  
22 that the job is ready for the final jobsite observation.
- 23 2. It is understood that if the Architect/Engineer finds the job not ready for the  
24 final observation and additional trips and observations are required to bring  
25 the project to completion, the cost of the additional time and expenses  
26 incurred by the Architect/Engineer will be deducted from the Contractor's  
27 final payment.
- 28 3. Contractor shall notify Architect/Engineer 48 hours prior to installation of  
29 ceilings or lay-in ceiling tiles.
- 30 C. The following must be submitted before Architect/Engineer recommends final  
31 payment:
- 32 1. Operation and maintenance manuals with copies of approved shop  
33 drawings.
- 34 2. As-built documents including marked-up or reproducible drawings and  
35 specifications.
- 36 3. A report documenting the instructions given to the Owner's representatives  
37 complete with the number of hours spent in the instruction. The report shall  
38 bear the signature of an authorized agent of this Contractor and shall be  
39 signed by the Owner's representatives.
- 40 4. Provide spare parts, maintenance, and extra materials in quantities  
41 specified in individual specification sections. Deliver to project site and place  
42 in location as directed and submit receipt to Architect/Engineer.

- 1                   5.        Inspection and testing report by the fire alarm system manufacturer.
- 2                   6.        Start-up reports on all equipment requiring a factory installation or start-up.

3    3.4    OPERATION AND MAINTENANCE MANUALS

4           A.        General:

- 5                   1.        Provide an electronic copy of the O&M manuals as described below for  
6                    Architect/Engineer's review and approval. The electronic copy shall be  
7                    corrected as required to address the Architect/Engineer's comments. Once  
8                    corrected, electronic copies and paper copies shall be distributed as  
9                    directed by the Architect/Engineer.
- 10                  2.        Approved O&M manuals shall be completed and in the Owner's possession  
11                  prior to Owner's acceptance and at least 10 days prior to instruction of  
12                  operating personnel.

13          B.        Electronic Submittal Procedures:

- 14                  1.        Distribution: Email the O&M manual as attachments to all parties designated  
15                  by the Architect/Engineer.
- 16                  2.        Transmittals: Each submittal shall include an individual electronic letter of  
17                  transmittal.
- 18                  3.        Format: Electronic submittals shall be in PDF format only. Scanned copies,  
19                  in PDF format, of paper originals are acceptable. Submittals that are not  
20                  legible will be rejected. Do not set any permission restrictions on files;  
21                  protected, locked, or secured documents will be rejected.
- 22                  4.        File Names: Electronic submittal file names shall include the relevant  
23                  specification section number followed by a description of the item submitted,  
24                  as follows. Where possible, include the transmittal as the first page of the  
25                  PDF instead of using multiple electronic files.
- 26                      a.        O&M file name: O&M.div26.contractor.YYYYMMDD  
27                      b.        Transmittal file name: O&Mtransmittal.div26.contractor.YYYYMMDD
- 28                  5.        File Size: Electronic file size shall be limited to a maximum of 4MB. Larger  
29                  files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2",  
30                  etc.
- 31                  6.        Provide the Owner with an approved copy of the O&M manual on compact  
32                  discs (CD), digital video discs (DVD), or flash drives with a permanently  
33                  affixed label, printed with the title "Operation and Maintenance Instructions",  
34                  title of the project and subject matter of disc/flash drive when multiple  
35                  disc/flash drives are required.
- 36                  7.        All text shall be searchable.
- 37                  8.        Bookmarks shall be used, dividing information first by specification section,  
38                  then systems, major equipment and finally individual items. All bookmark  
39                  titles shall include the nomenclature used in the construction documents and  
40                  shall be an active link to the first page of the section being referenced.

- 1 C. Paper Copy Submittal Procedures:
- 2 1. Once the electronic version of the manuals has been approved by the  
3 Architect/Engineer, three (3) paper copies of the O&M manual shall be  
4 provided to the Owner. The content of the paper copies shall be identical to  
5 the corrected electronic copy.
- 6 2. Binder Requirements: The Contractor shall submit three sets of O&M  
7 manuals in heavy duty, locking three ring binders. Incorporate clear vinyl  
8 sheet sleeves on the front cover and spine for slip-in labeling. "Peel and  
9 stick" labels are **not** acceptable. Sheet lifters shall be supplied at the front  
10 of each notebook. The three-ring binders shall be 1/2" (12mm) thicker than  
11 initial material to allow for future inserts. If more than one notebook is  
12 required, label in consecutive order. For example; 1 of 2, 2 of 2. No other  
13 form of binding is acceptable.
- 14 3. Binder Labels: Label the front and spine of each binder with "Operation and  
15 Maintenance Instructions", title of project, and subject matter.
- 16 4. Index Tabs: Divide information by specification section, major equipment, or  
17 systems using index tabs. All tab titling shall be clearly printed under  
18 reinforced plastic tabs. All equipment shall be labeled to match the  
19 identification in the construction documents.
- 20 D. Operation and Maintenance Instructions shall include:
- 21 1. Title Page: Include title page with project title, Architect, Engineer,  
22 Contractor, all subcontractors, and major equipment suppliers, with  
23 addresses, telephone numbers, website addresses, email addresses and  
24 point of contacts. Website URLs and email addresses shall be active links in  
25 the electronic submittal.
- 26 2. Table of Contents: Include a table of contents describing specification  
27 section, systems, major equipment, and individual items.
- 28 3. Copies of all final approved shop drawings and submittals. Include  
29 Architect's/Engineer's shop drawing review comments. Insert the individual  
30 shop drawing directly after the Operation and Maintenance information for  
31 the item(s) in the review form.
- 32 4. Copies of all factory inspections and/or equipment startup reports.
- 33 5. Copies of warranties.
- 34 6. Schematic wiring diagrams of the equipment that have been updated for  
35 field conditions. Field wiring shall have label numbers to match drawings.
- 36 7. Dimensional drawings of equipment.
- 37 8. Detailed parts lists with lists of suppliers.
- 38 9. Operating procedures for each system.
- 39 10. Maintenance schedule and procedures. Include a chart listing maintenance  
40 requirements and frequency.
- 41 11. Repair procedures for major components.

- 1                    12.      Replacement parts and service material requirements for each system and  
2                    the frequency of service required.
- 3                    13.      Instruction books, cards, and manuals furnished with the equipment.
- 4                    14.      Include record drawings of the one-line diagrams for each major system.  
5                    The graphic for each piece of equipment shown on the one-line diagram  
6                    shall be an active link to its associated Operation & Maintenance data.
- 7      3.5      INSTRUCTING THE OWNER'S REPRESENTATIVE
- 8                    A.      Adequately instruct the Owner's designated representatives in the maintenance,  
9                    care, and operation of the complete systems installed under this contract.
- 10                   B.      Minimum hours of instruction time for each item and/or system shall be as indicated  
11                   in each individual specification section.
- 12                   C.      Operating Instructions:
- 13                   1.      Contractor is responsible for all instructions to the Owner's representatives  
14                   for the electrical and specialized systems.
- 15                   2.      If the Contractor does not have staff that can adequately provide the  
16                   required instructions, he shall include in his bid an adequate amount to  
17                   reimburse the Owner for the Architect/Engineer to perform these services.
- 18      3.6      AS-BUILT DOCUMENTS
- 19                   A.      The following paragraphs supplement the requirements of Division 1.
- 20                   B.      Maintain at the job site a separate and complete set of electrical drawings and  
21                   specifications with all changes made to the systems clearly and permanently marked  
22                   in complete detail.
- 23                   C.      Mark drawings and specifications to indicate approved substitutions; Change  
24                   Orders, and actual equipment and materials used. All Change Orders, RFI  
25                   responses, Clarifications and other supplemental instructions shall be marked on the  
26                   documents. As-built documents that merely reference the existence of the above  
27                   items are not acceptable. Should this Contractor fail to complete As-built Documents  
28                   as required by this contract, this Contractor shall reimburse Architect/Engineer for all  
29                   costs to develop record documents that comply with this requirement.  
30                   Reimbursement shall be made at the Architect/Engineer's hourly rates in effect at  
31                   the time of work.
- 32                   D.      Record changes daily and keep the marked drawings available for the  
33                   Owners/Architect/Engineer's examination at any normal work time.
- 34                   E.      Upon completing the job, and before final payment is made, give the marked-up  
35                   drawings to the Architect/Engineer.
- 36      3.7      PAINTING
- 37                   A.      Paint all equipment that is marred or damaged prior to the Owner's acceptance.  
38                   Paint and color shall match original equipment paint and shall be obtained from the  
39                   equipment supplier if available. All equipment shall have a finished coat of paint  
40                   applied unless specifically allowed to be provided with a prime coat only.

- 1 B. Equipment in finished areas that will be painted to match the room decor will be  
2 painted by others. Should this Contractor install equipment in a finished area after  
3 the area has been painted, he shall have the equipment and all its supports,  
4 hangers, etc., painted to match the room decor. Painting shall be performed as  
5 described in project specifications.
- 6 C. Equipment cabinets, casings, covers, metal jackets, etc., located in equipment  
7 rooms or concealed spaces, shall be furnished in standard finish, free from  
8 scratches, abrasions, chippings, etc.
- 9 D. Equipment in occupied spaces, or if standard to the unit, shall have a baked primer  
10 with baked enamel finish coat free from scratches, abrasions, chipping, etc. If color  
11 option is specified or is standard to the unit, verify with the Architect his color  
12 preference before ordering.
- 13 E. Paint all equipment in unfinished areas such as boiler room, mechanical spaces,  
14 and storage rooms. Equipment furnished with a suitable factory finish need not be  
15 painted; provided the factory applied finish is not marred or spattered. If so,  
16 equipment shall be refinished with the same paint as was factory applied.
- 17 F. All electrical conduit and equipment, fittings, hangers, structural supports, etc., in  
18 unfinished areas, such as equipment and storage room area, shall be painted two  
19 (2) coats of oil paint of colors selected by the Architect.
- 20 G. Do NOT paint electric conduits in crawl spaces, tunnels, or spaces above  
21 suspended ceilings except that where conduit is in a damp location give exposed  
22 threads at joints two coats of sealer after joint is made up.
- 23 H. After surfaces have been thoroughly cleaned and are free of oil, dirt or other foreign  
24 matter, paint all raceway and equipment with the following:
- 25 1. Bare Metal Surfaces - Apply one coat of metal primer suitable for the metal  
26 being painted. Finish with two coats of Alkyd base enamel paint.
- 27 2. Plastic Surfaces - Paint plastic surfaces with two coats of semi-gloss acrylic  
28 latex paint.

29 3.8 ADJUST AND CLEAN

- 30 A. Thoroughly clean all equipment and systems prior to the Owner's final acceptance of  
31 the project.
- 32 B. Clean all foreign paint, grease, oil, dirt, labels, stickers, etc. from all equipment.
- 33 C. Remove all rubbish, debris, etc., accumulated during construction from the  
34 premises.

35 3.9 SPECIAL REQUIREMENTS

- 36 A. Coordinate the installation of all equipment, controls, devices, etc., with other trades  
37 to maintain clear access area for servicing.
- 38 B. Install all equipment to maximize access to parts needing service or maintenance.  
39 Review the final location, placement, and orientation of equipment with the Owner's  
40 representative prior to setting equipment.
- 41 C. Installation of equipment or devices without regard to coordination of access  
42 requirements and confirmation with the Owner's representative will result in removal  
43 and reinstallation of the equipment at the Contractor's expense.

- 1 D. In accordance with LEED EQc4.1, Low-Emitting Materials - Adhesives and Sealants,  
2 all adhesives and sealants used on the interior of the building must comply with the  
3 following requirements:
- 4 1. Adhesives, sealants and sealant primers must comply with South Coast Air  
5 Quality Management District (SCAQMD) Rule #1168.
- 6 2. Aerosol adhesives must comply with Green Seal Standard for Commercial  
7 Adhesives GS-36 requirements in effect on October 19, 2000.
- 8 3.10 INDOOR AIR QUALITY (IAQ) MAINTENANCE FOR OCCUPIED FACILITIES UNDER  
9 CONSTRUCTION
- 10 A. Within the limits of Construction:
- 11 1. The Electrical Contractor shall coordinate all work with the contractor  
12 responsible for IAQ.
- 13 2. The means, methods and materials used by the Electrical Contractor shall  
14 be coordinated with the contractor responsible for IAQ and shall comply with  
15 the IAQ requirements set forth in Division of these specifications.
- 16 B. Outside the limits of Construction:
- 17 1. IAQ shall be the responsibility of the electrical contractor for work that is  
18 required outside the limits of construction.
- 19 2. The Electrical Contractor is responsible for the IAQ set forth in Division of  
20 these specifications.
- 21 3. The Electrical Contractor shall review and coordinate all IAQ plans and  
22 procedures with the owner's IAQ representative.
- 23 3.11 SYSTEM COMMISSIONING
- 24 A. The electrical systems shall be complete and operating. System start-up, testing,  
25 balancing, and satisfactory system performance is the responsibility of the  
26 Contractor. This includes all calibration and adjustment of electrical controls,  
27 balancing of loads, troubleshooting and verification of software, and final  
28 adjustments that may be needed.
- 29 B. All operating conditions and control sequences shall be tested during the start-up  
30 period. Testing all interlocks, safety shut-downs, controls, and alarms.
- 31 1. The Contractor, subcontractors, and equipment suppliers shall have skilled  
32 technicians to ensure that all systems perform properly. If the  
33 Architect/Engineer is requested to visit the job site for trouble shooting,  
34 assisting in start-up, obtaining satisfactory equipment operation, resolving  
35 installation and/or workmanship problems, equipment substitution issues or  
36 unsatisfactory system performance, including call backs during the warranty  
37 period, through no fault of the design; the Contractor shall reimburse the  
38 Owner on a time and materials basis for services rendered at the  
39 Architect/Engineer's standard hourly rates in effect when the services are  
40 requested. The Contractor shall pay the Owner for services required that are  
41 product, installation or workmanship related. Payment is due within 30 days  
42 after services are rendered.

## 1 3.12 FIELD QUALITY CONTROL

## 2 A. General:

- 3 1. Conduct all tests required during and after construction.
- 4 2. Supply necessary instruments, meters, etc., for the tests. Supply competent  
5 technicians with training in the proper testing techniques.
- 6 3. All cables and wires shall be tested for shorts and grounds following  
7 installation and connection to devices. Replace shorted or grounded wires  
8 and cables.
- 9 4. Any wiring device, electrical apparatus or lighting fixture, if grounded or  
10 shorted on any integral "live" part, shall have all defective parts or materials  
11 replaced.

## 12 B. Other Equipment:

- 13 1. Give other equipment furnished and installed by the Contractor all standard  
14 tests normally made to assure that the equipment is electrically sound, all  
15 connections properly made, phase rotation correct, fuses and thermal  
16 elements suitable for protection against overloads, voltage complies with  
17 equipment nameplate rating, and full load amperes are within equipment  
18 rating.

- 19 C. If any test results are not satisfactory, make adjustments, replacements and  
20 changes as needed and repeat the tests and make additional tests as the  
21 Architect/Engineer or authority having jurisdiction deem necessary.

22 END OF SECTION

1     **SECTION 26 05 03 - THROUGH PENETRATION FIRESTOPPING**

2     **PART 1 - GENERAL**

3     1.1     SECTION INCLUDES

4           A.     Through-Penetration Firestopping.

5     1.2     QUALITY ASSURANCE

6           A.     Manufacturer: Company specializing in manufacturing products specified in this  
7                 Section.

8           B.     Installer: Individuals performing work shall be certified by the manufacturer of the  
9                 system selected for installation.

10    1.3     REFERENCES

11           A.     UL 723 - Surface Burning Characteristics of Building Materials

12           B.     ANSI/UL 1479 - Fire Tests of Through Penetration Firestops

13           C.     UL Fire Resistance Directory Through Penetration Firestop Systems (XHEZ)

14           D.     Warnock Hersey - Directory of Listed Products

15           E.     ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building  
16                 Materials

17           F.     ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops

18           G.     The Building Officials and Code Administrators National Building Code

19           H.     2009 Uniform Building Code

20           I.     Wisconsin Administrative Code

21           J.     2009 International Building Code

22           K.     NFPA 5000 – Building Construction Safety Code

23    1.4     DELIVERY, STORAGE, AND HANDLING

24           A.     Store, protect and handle products on site. Accept material on site in factory  
25                 containers and packing. Inspect for damage. Protect from deterioration or damage  
26                 due to moisture, temperature changes, contaminants, or other causes. Follow  
27                 manufacturer's instructions for storage.

28           B.     Install material prior to expiration of product shelf life.

29    1.5     PERFORMANCE REQUIREMENTS

30           A.     General: For penetrations through the following fire-resistance-rated constructions,  
31                 including both empty openings and openings containing penetrating items, provide  
32                 through-penetration firestop systems that are produced and installed to resist spread  
33                 of fire according to requirements indicated, resist passage of smoke and other  
34                 gases, and maintain original fire-resistance rating of construction penetrated.

35                 1.     Fire-resistance-rated walls including fire partitions, fire barriers, and smoke  
36                 barriers.

37                 2.     Fire-resistance-rated horizontal assemblies including floors, floor/ceiling  
38                 assemblies, and ceiling membranes of roof/ceiling assemblies.

- 1 B. Rated Systems: Provide through-penetration firestop systems with the following  
2 ratings determined per UL 1479:
- 3 1. F-Rated Systems: Provide through-penetration firestop systems with F-  
4 ratings indicated, but not less than that equaling or exceeding fire-resistance  
5 rating of constructions penetrated.
- 6 2. T-Rated Systems: For the following conditions, provide through-penetration  
7 firestop systems with T-ratings indicated, as well as F-ratings:
- 8 a. Floor penetrations located outside wall cavities.  
9 b. Floor penetrations located outside fire-resistance-rated shaft  
10 enclosures.  
11 c. Wall penetrations above corridor ceilings which are not part of a fire-  
12 resistive assembly.  
13 d. Wall penetrations below any ceiling that are larger than 4" diameter  
14 or 16 square inches.
- 15 C. For through-penetration firestop systems exposed to light, traffic, moisture, or  
16 physical damage, provide products that, after curing, do not deteriorate when  
17 exposed to these conditions both during and after construction.
- 18 D. For through-penetration firestop systems exposed to view, provide products with  
19 flame-spread and smoke-developed indexes of less than 25 and 450, respectively,  
20 as determined per ASTM E 84.
- 21 E. For through-penetration firestop systems in air plenums, provide products with  
22 flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as  
23 determined per ASTM E 84.
- 24 1.6 WARRANTY
- 25 A. Provide one year warranty on parts and labor.
- 26 B. Warranty shall cover repair or replacement of firestop systems which fail in joint  
27 adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance,  
28 migration resistance, stain resistance, general durability, or appear to deteriorate in  
29 any manner not clearly specified by the manufacturer as an inherent quality of the  
30 material.

## 31 PART 2 - PRODUCTS

### 32 2.1 MANUFACTURERS

- 33 A. Products: Subject to compliance with requirements, provide one of the through-  
34 penetration firestop systems indicated for each application that are produced by one  
35 of the following manufacturers. All firestopping systems installed shall be provided  
36 by a single manufacturer.
- 37 1. 3M; Fire Protection Produces Division.  
38 2. Hilti, Inc.  
39 3. RectorSeal Corporation, Metacaulk.  
40 4. Tremco; Sealant/Weatherproofing Division.  
41 5. Johns-Manville.  
42 6. Specified Technologies Inc. (S.T.I.)  
43 7. Spec Seal Firestop Products  
44 8. AD Firebarrier Protection Systems  
45 9. Wiremold/legrand: FlameStopper

- 1 2.2 THROUGH PENETRATION FIRESTOP SYSTEMS
- 2 A. Provide materials and systems classified by or listed by Warnock Hersey to provide  
3 firestopping equal to time rating of construction being penetrated.
- 4 B. All firestopping materials shall be free of asbestos, lead, PCB's, and other materials  
5 that would require hazardous waste removal.
- 6 C. Firestopping shall be flexible to allow for normal penetrating item movement due to  
7 expansion and contraction.
- 8 D. Firestopping systems for plumbing and wet pipe sprinkler piping shall be moisture  
9 resistant.
- 10 E. Provide firestopping systems capable of supporting floor loads where systems are  
11 exposed to possible floor loading or traffic.
- 12 F. Provide firestopping systems allowing continuous insulation for all insulated pipes.
- 13 G. Provide firestopping systems classified by UL or listed by Warnock Hersey for  
14 penetrations through all fire rated construction. Firestopping systems shall be  
15 selected from the UL or listed by Warnock Hersey Fire Resistance Directory  
16 Category XHEZ based on substrate construction and penetrating item size and  
17 material and shall fall within the range of numbers listed:

- 18 1. Combustible Framed Floors and Chase Walls - 1 or 2 Hour Rated  
19 F Rating = Floor/Wall Rating  
20 T Rating = Floor/Wall Rating

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	FC 0000-0999*
Metallic Pipe or Conduit	FC 1000-1999
Non-Metallic Pipe or Conduit	FC 2000-2999
Electrical Cables	FC 3000-3999
Cable Trays	FC 4000-4999
Insulated Pipes	FC 5000-5999
Bus Duct and Misc. Electrical	FC 6000-6999
Duct without Damper and Misc. Mechanical	FC 7000-7999
Multiple Penetrations	FC 8000-8999

- 21 2. Non-Combustible Framed Walls - 1 or 2 Hour Rated  
22 F Rating = Wall Rating  
23 T Rating = 0

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	WL 0000-0999*
Metallic Pipe or Conduit	WL 1000-1999
Non-Metallic Pipe or Conduit	WL 2000-2999
Electrical Cables	WL 3000-3999
Cable Trays	WL 4000-4999
Insulated Pipes	WL 5000-5999
Bus Duct and Misc. Electrical	WL 6000-6999
Duct without Damper and Misc. Mechanical	WL 7000-7999
Multiple Penetrations	WL 8000-8999

- 1 3. Concrete or Masonry Floors and Walls - 1 or 2 Hour Rated  
 2 F Rating = Wall/Floor Rating  
 3 T Rating (Floors) = Floor Rating

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	CAJ 0000-0999*
Metallic Pipe or Conduit	CAJ 1000-1999
Non-Metallic Pipe or Conduit	CAJ 2000-2999
Electrical Cables	CAJ 3000-3999
Cable Trays	CAJ 4000-4999
Insulated Pipes	CAJ 5000-5999
Bus Duct and Misc. Electrical	CAJ 6000-6999
Duct without Damper and Misc. Mechanical	CAJ 7000-7999
Multiple Penetrations	CAJ 8000-8999

4 \*Alternate method of firestopping is patching opening to match original rated  
 5 construction.

- 6 H. Any opening in walls or floors not covered by the listed series of numbers shall be  
 7 coordinated with the firestopping manufacturer.
- 8 I. Any openings in floors or walls not described in the UL or listed by Warnock Hersey  
 9 Fire Resistance Directory, or outlined in manufacturer's information shall be sealed  
 10 in a manner agreed upon by the Firestopping Manufacturer, Owner, and the  
 11 Authority Having Jurisdiction.

## 12 PART 3 - EXECUTION

### 13 3.1 EXAMINATION

- 14 A. Ensure all surfaces that contact seal materials are free of dirt, dust, grease, oil, rust,  
 15 or loose materials. Clean and repair surfaces as required. Remove laitance and  
 16 form-release agents from concrete.
- 17 B. Ensure substrate and penetrating items have been permanently installed prior to  
 18 installing firestopping systems. Ensure penetrating items have been properly  
 19 spaced and have proper clearance prior to installing firestopping systems.
- 20 C. Surfaces to which sealing materials are to be installed must meet the selected UL or  
 21 Warnock Hersey system substrate criteria.
- 22 D. Prime substrates where recommended in writing by through-penetration firestop  
 23 system manufacturer. Confine primer to area of bond.

### 24 3.2 INSTALLATION

- 25 A. In existing construction, provide firestopping of openings prior to and after  
 26 installation of penetrating items. Remove any existing coatings on surfaces prior to  
 27 firestopping installation. Temporary firestopping shall consist of packing openings  
 28 with fire resistant mineral wool for the full thickness of substrate, or an alternate  
 29 method approved by the Authority Having Jurisdiction. All openings shall be  
 30 temporarily firestopped immediately upon their installation and shall remain so until  
 31 the permanent UL or listed by Warnock Hersey listed firestopping system is  
 32 installed.

- 1 B. Install penetration seal materials in accordance with printed instructions of the UL or  
2 Warnock Hersey Fire Resistance Directory and with the manufacturer's printed  
3 application instructions.
- 4 C. Install dams as required to properly contain firestopping materials within openings  
5 and as required to achieve required fire resistance rating. Remove combustible  
6 damming after appropriate curing.
- 7 3.3 CLEANING AND PROTECTING
- 8 A. Clean excess fill materials adjacent to openings as Work progresses by methods  
9 and with cleaning materials that are approved in writing by through-penetration  
10 firestop system manufacturers and that do not cause damage.
- 11 B. Provide final protection and maintain conditions during and after installation that  
12 ensure that through-penetration firestop systems are without damage or  
13 deterioration at time of Substantial Completion. If, despite such protection, damage  
14 or deterioration occurs, remove damaged or deteriorated through-penetration  
15 firestop systems immediately and install new materials to produce systems  
16 complying with specified requirements.
- 17 3.4 INSPECTION
- 18 A. All penetrations shall be inspected by the manufacturer's representative to ensure  
19 proper installation.
- 20 B. Access to firestop systems shall be maintained for examination by the Authority  
21 Having Jurisdiction at their request.
- 22 C. Proceed with enclosing through-penetration firestop system with other construction  
23 only after inspection reports are issued and firestop installations comply with  
24 requirements.
- 25 D. The contractor shall allow for visual destructive review of 5% of installed firestop  
26 systems (minimum of one) to prove compliance with specifications and  
27 manufacturer's instructions and details. Destructive system removal shall be  
28 performed by the contractor and witnessed by the Architect/Engineer and  
29 manufacturer's factory representative. The Architect/Engineer shall have sole  
30 discretion of which firestop system installations will be reviewed. The contractor is  
31 responsible for all costs associated with this requirement including labor and  
32 material for removing and replacing the installed firestop system. If any firestop  
33 system is found to not be installed per manufacturer's specific instructions and  
34 details, all firestop systems are subject to destructive review and replacement at the  
35 Architect/Engineer's discretion and the contractor's expense.
- 36 END OF SECTION

1     **SECTION 26 05 05 - ELECTRICAL DEMOLITION FOR REMODELING**

2     **PART 1 - GENERAL**

3     1.1    SECTION INCLUDES

- 4            A.     Electrical demolition

5     **PART 2 - PRODUCTS**

6     2.1    MATERIALS AND EQUIPMENT

- 7            A.     Materials and equipment for patching and extending work shall be as specified in  
8                individual Sections.

9     **PART 3 - EXECUTION**

10    3.1    EXAMINATION

- 11            A.     THE DRAWINGS ARE INTENDED TO INDICATE THE SCOPE OF WORK  
12                REQUIRED AND DO NOT INDICATE EVERY BOX, CONDUIT, OR WIRE THAT  
13                MUST BE REMOVED. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO  
14                SUBMITTING A BID AND VERIFY EXISTING CONDITIONS.

- 15            B.     Where walls, ceilings, structures, etc., are indicated as being removed on general or  
16                electrical drawings, the Contractor shall be responsible for the removal of all  
17                electrical equipment, devices, fixtures, raceways, wiring, systems, etc., from the  
18                removed area.

- 19            C.     Where ceilings, walls, structures, etc., are temporarily removed and replaced by  
20                others, this Contractor shall be responsible for the removal, storage, and  
21                replacement of equipment, devices, fixtures, raceways, wiring, systems, etc.

- 22            D.     Where technology equipment is indicated as being removed on electrical,  
23                mechanical, or technology drawings, the Contractor shall be responsible for  
24                disconnecting the equipment and removing all controllers, electrical equipment,  
25                raceways, wiring, etc. associated with the device.

- 26            E.     Verify that abandoned wiring and equipment serve only abandoned equipment or  
27                facilities. Extend conduit and wire to facilities and equipment that will remain in  
28                operation following demolition. Extension of conduit and wire to equipment shall be  
29                compatible with the surrounding area. Extended conduit and conductors to match  
30                existing size and material.

- 31            F.     Coordinate scope of work with all other Contractors and the Owner at the project  
32                site. Schedule removal of equipment and electrical service to avoid conflicts.

- 33            G.     Bid submittal shall mean the Contractor has visited the project site and has verified  
34                existing conditions and scope of work.

35    3.2    PREPARATION

- 36            A.     The Contractor shall obtain approval from the Owner before turning off power to  
37                circuits, feeders, panels, etc. Coordinate all outages with Owner.

- 1 B. Provide temporary wiring and connections to maintain existing systems in service  
2 during construction. When work must be performed on energized equipment or  
3 circuits use personnel experienced in such operations. Assume all equipment and  
4 systems must remain operational unless specifically noted otherwise on drawings.
- 5 C. Disconnect electrical systems in walls, floors, structures, and ceilings scheduled for  
6 removal.
- 7 D. Existing Fire Alarm System: Maintain existing system in service until new system is  
8 accepted. Disable system only to make switchovers and connections. Obtain  
9 permission from Owner at least 48 hours before partially or completely disabling  
10 system. Minimize outage duration. Make temporary connections to maintain  
11 service in areas adjacent to work area. Provide a watchman to make required  
12 premise observations during all outages, requirements as dictated by codes and  
13 Owner's insurance carrier.
- 14 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK
- 15 A. Demolish and extend existing electrical work under provisions of Division 1 of  
16 Specifications and this Section.
- 17 B. Remove, relocate, and extend existing installations to accommodate new  
18 construction.
- 19 C. Remove abandoned wiring and raceway to source of supply. Existing conduit in  
20 good condition may be reused in place by including an equipment ground conductor  
21 in reused conduit. Relocating conduit shall not be allowed.
- 22 D. Remove exposed abandoned raceway, including abandoned raceway above  
23 accessible ceiling finishes. Cut raceway flush with walls and floors, and patch  
24 surfaces. Remove all associated clamps, hangers, supports, etc. associated with  
25 raceway removal.
- 26 E. Disconnect and remove outlets and devices that are to be demolished. Remove  
27 conduit, supports, and conductors back to source. Devices' back box and conduit  
28 mounted in walls that are to remain can be abandoned in place. Provide appropriate  
29 cover plate for all abandoned back boxes, matching cover plate material specified  
30 on project material list.
- 31 F. Disconnect and remove electrical devices and equipment serving utilization  
32 equipment that has been removed.
- 33 G. Repair adjacent construction and finishes damaged during demolition and extension  
34 work. Patch openings to match existing surrounding finishes.
- 35 H. Maintain access to existing electrical installations that remain active. Modify  
36 installation or provide junction boxes and access panel as appropriate.
- 37 I. Extend existing installations using materials and methods compatible with existing  
38 electrical installations, or as specified. Extended conduit and conductors to match  
39 existing size and material.
- 40 J. Regulatory Requirements: Comply with governing EPA notification regulations  
41 before beginning demolition. Comply with hauling and disposal regulations of  
42 authorities having jurisdiction.

- 1 K. Floor slabs may contain conduit systems. This Contractor is responsible for taking  
2 any measures required to ensure no conduits or other services are damaged. This  
3 includes x-ray or similar non-destructive means. Where conduit is in concrete slab,  
4 cut conduit flush with floor, pull out conductors, and plug conduit ends.
- 5 L. This Contractor is responsible for all costs incurred in repair, relocations, or  
6 replacement of any cables, conduits, or other services if damaged without proper  
7 investigation.
- 8 3.4 CLEANING AND REPAIR
- 9 A. Clean and repair existing materials and equipment that remain or are to be reused.
- 10 B. Panelboards: Clean exposed surfaces and check tightness of electrical  
11 connections. Replace damaged circuit breakers and provide closure plates for  
12 vacant positions. Provide typed circuit directory showing revised circuiting  
13 arrangement.
- 14 C. ELECTRICAL ITEMS (E.G., LIGHTING FIXTURES, RECEPTACLES, SWITCHES,  
15 CONDUIT, WIRE, ETC.) REMOVED AND NOT RELOCATED REMAIN THE  
16 PROPERTY OF THE OWNER. CONTRACTOR SHALL PLACE ITEMS RETAINED  
17 BY THE OWNER IN A LOCATION COORDINATED WITH THE OWNER. THE  
18 CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF MATERIAL  
19 THE OWNER DOES NOT WANT.
- 20 3.5 INSTALLATION
- 21 A. Install relocated materials and equipment under the provisions of Division 1 of  
22 Specifications.
- 23 END OF SECTION

1     **SECTION 26 05 13 - WIRE AND CABLE**

2     **PART 1 - GENERAL**

3     1.1    SECTION INCLUDES

- 4           A.     Building wire
- 5           B.     Remote control and signal cable
- 6           C.     Fire rated cable
- 7           D.     Healthcare facilities cable
- 8           E.     Armored cable (AC)
- 9           F.     Metal-clad cable (MC)

10    1.2    REFERENCES

- 11           A.     NEMA WC 70 - Power Cables Rated 2,000V or Less for the Distribution of Electrical
- 12                 Energy
- 13           B.     UL 44 – Thermoset-Insulated Wires and Cables
- 14           C.     UL 83 – Thermoplastic-Insulated Wires and Cables
- 15           D.     UL 854 – Service-Entrance Cables
- 16           E.     UL 1581 – Standard for Electrical Wires, Cables, and Flexible Cords

17    **PART 2 - PRODUCTS**

18    2.1    BUILDING WIRE

- 19           A.     Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600
- 20                 volt insulation, THHN/THWN.
- 21           B.     Feeders and Branch Circuits Larger than 6 AWG in Underground Conduit: Copper,
- 22                 stranded conductor, 600 volt insulation, THWN.
- 23           C.     Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt
- 24                 insulation, THHN/THWN. 6 and 8 AWG, stranded conductor; smaller than 8 AWG,
- 25                 solid or stranded conductor, unless otherwise noted on the drawings.
- 26           D.     Control Circuits: Copper, stranded conductor 600 volt insulation, THHN/THWN.
- 27           E.     Each 120 and 277 volt branch circuit shall have a dedicated neutral conductor.
- 28                 Neutral conductors shall be considered current-carrying conductors for wire
- 29                 derating.

30    2.2    REMOTE CONTROL AND SIGNAL CABLE

- 31           A.     Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor,
- 32                 600 volt insulation, rated 60°C, individual conductors twisted together, shielded, and
- 33                 covered with a PVC jacket.
- 34           B.     Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper
- 35                 conductor, 300 volt insulation, rated 60°C, individual conductors twisted together,
- 36                 shielded, and covered with a PVC jacket; UL listed.

- 1 C. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper  
2 conductor, 300 volt insulation, rated 60°C, individual conductors twisted together,  
3 shielded, and covered with a nonmetallic jacket; UL listed for use in air handling  
4 ducts, hollow spaces used as ducts, and plenums.

5 2.3 FIRE-RATED CABLE

- 6 A. Two-hour Fire Rated Mineral Insulated Cables: Copper conductor, 600 volt  
7 insulation, rated 90°C, Type MI.

8 **PART 3 - EXECUTION**

9 3.1 WIRE AND CABLE INSTALLATION SCHEDULE

- 10 A. Above Accessible Ceilings: Building wire in raceways. Low voltage cable (less than  
11 100 volts) may be installed without conduit. Low voltage cables in ducts, plenums  
12 and other air-handling spaces shall be plenum listed.

- 13 B. All Other Locations: Building wire in raceway.

- 14 C. Above Grade: All conductors installed above grade shall be type "THHN".

- 15 D. Underground or In Slab: All conductors shall be type "THWN".

16 3.2 WIRE FOR SPECIALIZED SYSTEMS

- 17 A. Wire for the following specialized systems shall be as designated on the drawings,  
18 or elsewhere in these specifications. If not designated on the drawings or  
19 specifications, the system manufacturer's recommendations shall be followed:

- 20 1. Fire alarm  
21 2. Low voltage switching  
22 3. Nurse call  
23 4. Electronic control  
24 5. Security

25 3.3 CONTRACTOR CHANGES

- 26 A. The basis of design is copper conductors installed in raceway based on ambient  
27 temperature of 30°C, NEC Table 310.16.

- 28 B. The Contractor shall be responsible for derating and sizing conductors and conduits  
29 to equal or exceed the ampacity of the basis of design circuits, if he/she chooses to  
30 use methods or materials other than the basis of design.

31 3.4 GENERAL WIRING METHODS

- 32 A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller  
33 than 14 AWG for control wiring.

- 34 B. Use no wire smaller than 18 AWG for low voltage control wiring (<100 volts).

- 35 C. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer  
36 than 75 feet, and for 20 ampere, 277 volt branch circuit home runs longer than 200  
37 feet.

- 38 D. Use no wire smaller than 8 AWG for outdoor lighting circuits.

- 1 E. The ampacity of multiple conductors in one conduit shall be derated per National  
2 Electrical Code, Article 310. In no case shall more than 4 conductors be installed in  
3 one conduit to such loads as motors larger than 1/4 HP, panelboards, motor control  
4 centers, etc.
- 5 F. Where installing parallel feeders, place an equal number of conductors for each  
6 phase of a circuit in same raceway or cable.
- 7 G. Splice only in junction or outlet boxes.
- 8 H. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- 9 I. Make conductor lengths for parallel circuits equal.
- 10 J. All conductors shall be continuous in conduit from last outlet to their termination.
- 11 K. Terminate all spare conductors on terminal blocks, and label the spare conductors.
- 12 L. Cables or wires shall not be laid out on the ground before pulling.
- 13 M. Cables or wires shall not be dragged over earth or paving.
- 14 N. Care shall be taken so as not to subject the cable or wire to high mechanical  
15 stresses that would cause damage to the wire and cable.
- 16 O. At least six (6)-inch loops or ends shall be left at each outlet for installation  
17 connection of luminaires or other devices.
- 18 P. All wires in outlet boxes not connected to fixtures or other devices shall be rolled up,  
19 spliced if continuity of circuit is required, and insulated.

### 20 3.5 WIRING INSTALLATION IN RACEWAYS

- 21 A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling  
22 lubricant for pulling 4 AWG and larger wires.
- 23 B. Install wire in raceway after interior of building has been physically protected from  
24 the weather and all mechanical work likely to injure conductors has been completed.
- 25 C. Pulling shall be continuous without unnecessary stops and starts with wire or cable  
26 only partially thru raceway.
- 27 D. Where reels of cable or wire are used, they shall be set up on jacks close to the  
28 point where the wire or cable enters the conduit or duct so that the cable or wire may  
29 be unreeled and run into the conduit or duct with a minimum of change in the  
30 direction of the bend.
- 31 E. Conductors shall not be pulled through conduits until plastering or masonry work is  
32 completed and conduits are free from moisture. Care shall be taken so that long  
33 pulls of wire or pulls around several bends are not made where the wire may be  
34 permanently stretched and the insulation damaged.
- 35 F. Only nylon rope shall be permitted to pull cables into conduit and ducts.
- 36 G. Completely and thoroughly swab raceway system before installing conductors.

### 37 3.6 CABLE INSTALLATION

- 38 A. Provide protection for exposed cables where subject to damage.

- 1 B. Use suitable cable fittings and connectors.
- 2 C. Run all open cable in a neat and symmetrical manner. Follow the routing as  
3 illustrated on the drawings as closely as possible. If routing is not illustrated then the  
4 Contractor shall choose his own routing, but in any case it shall be run in a manner  
5 previously stated.
- 6 D. Open cable shall be supported by the appropriate size bridle rings or other means if  
7 called for on the drawings. Wire and cable from different systems shall not be  
8 installed in the same bridle rings.
- 9 E. Open cable installed above suspended ceilings shall not rest on the suspended  
10 ceiling construction, nor utilize the ceiling support system for wire and cable support.
- 11 F. Where open cables are grouped, they shall be neatly bundled and held together with  
12 nylon tie wraps placed every 2.5 ft. on the bundle. Where tie bundle passes through  
13 a bridle ring it shall be fastened to the ring with a tie wrap.
- 14 G. Bridle ring supports shall be installed at a minimum of five foot (5') intervals. All  
15 rings shall be installed where completely accessible and not blocked by piping,  
16 ductwork, inaccessible ceilings, etc.
- 17 H. Open cable shall only be installed where specifically shown on the drawings, or  
18 permitted in these specifications.

19 3.7 FIRE-RATED CABLE INSTRUCTIONS

- 20 A. Terminations of the fire-rated cable must be outside of the fire zone.
- 21 B. Fire-rated cable shall be installed according to the manufacturer's  
22 recommendations.

23 3.8 WIRING CONNECTIONS AND TERMINATIONS

- 24 A. Splice and tap only in accessible junction boxes.
- 25 B. Use solderless, tin-plated copper, compression terminals (lugs) applied with  
26 circumferential crimp for copper conductor terminations, 8 AWG and larger.
- 27 C. Use solderless, tin-plated, compression terminals (lugs) applied with indenter crimp  
28 for copper conductor terminations, 10 AWG and smaller.
- 29 D. Use solderless pressure connectors with insulating covers for copper wire splices  
30 and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire  
31 connectors with plastic caps.
- 32 E. Use copper, compression connectors applied with circumferential crimp for copper  
33 wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and  
34 connectors with electrical tape to 150 percent of the insulation value of conductor.
- 35 F. Thoroughly clean wires before installing lugs and connectors.
- 36 G. Make splices, taps and terminations to carry full ampacity of conductors without  
37 perceptible temperature rise.
- 38 H. Phase Sequence: All apparatus shall be connected to operate in the phase  
39 sequence A-B-C representing the time sequence in which the phase conductors so  
40 identified reach positive maximum voltage.

- 1 I. As a general rule, applicable to switches, circuit breakers, starters, panelboards,  
2 switchgear and the like, the connections to phase conductors are intended thus:
- 3 1. Facing the front and operating side of the equipment, the phase  
4 identification shall be:
- 5 a. Left to Right - A-B-C  
6 b. Top to Bottom - A-B-C
- 7 J. Connection revisions as required to achieve correct rotation of motors shall be made  
8 at the load terminals of the starters or disconnect switches.
- 9 3.9 FIELD QUALITY CONTROL
- 10 A. Field inspection and testing will be performed under provisions of Division 1.
- 11 B. Building Wire and Power Cable Testing: Test shall be made by means of an  
12 insulation testing device such as a "Megger" using not less than 500 volts D.C. test  
13 potential.
- 14 C. Inspect wire and cable for physical damage and proper connection.
- 15 D. Torque test conductor connections and terminations to manufacturers  
16 recommended values.
- 17 E. Perform continuity test on all power and equipment branch circuit conductors. Verify  
18 proper phasing connections.
- 19 END OF SECTION



- 1 6. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies  
2 of neoprene elements and steel sleeves designed for seismically rated rigid  
3 equipment mountings, and matched to the type and size of attachment  
4 devices used.
- 5 7. Concrete Anchors: Fasten to concrete using cast-in or post-installed  
6 anchors designed per the requirements of Appendix D of ACI 318-05. Post-  
7 installed anchors shall be qualified for use in cracked concrete by ACI-  
8 355.2.
- 9 8. Masonry Anchors: Fasten to concrete masonry units with expansion  
10 anchors or self-tapping masonry screws. For expansion anchors into hollow  
11 concrete block, use sleeve-type anchors designed for the specific  
12 application. Do not fasten in masonry joints. Do not use powder actuated  
13 fasteners, wooden plugs, or plastic inserts.

## 14 PART 3 - EXECUTION

### 15 3.1 INSTALLATION

- 16 A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building  
17 structure using expansion anchors in concrete and beam clamps on structural steel.
- 18 B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum  
19 board partitions and walls; expansion anchors or preset inserts in solid masonry  
20 walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal  
21 screws in sheet metal studs; and wood screws in wood construction.
- 22 C. Do not fasten supports to ceiling systems, piping, ductwork, mechanical equipment,  
23 or conduit, unless otherwise noted.
- 24 D. Do not use powder-actuated anchors without specific permission.
- 25 E. Do not drill structural steel members.
- 26 F. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to  
27 present a neat appearance. Use hexagon head bolts with spring lock washers  
28 under all nuts.
- 29 G. In wet locations and on all building floors below exterior earth grade install  
30 free-standing electrical equipment on concrete pads.
- 31 H. Bridge studs top and bottom with channels to support flush-mounted cabinets and  
32 panelboards in stud walls.
- 33 I. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when  
34 attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs.  
35 load and 2'-0" spacing include adjacent electrical and mechanical items hanging  
36 from deck. If the hanger restrictions cannot be achieved, supplemental framing off  
37 steel framing will need to be added.
- 38 J. Refer to Section 26 05 33 for special conduit supporting requirements.

### 39 3.2 FINISH

- 40 A. Prime coat exposed steel hangers and supports. Hangers and supports in crawl  
41 spaces, pipe shafts, and above suspended ceiling spaces are not considered  
42 exposed.

1           B.     Trim all ends of exposed field fabricated steel hangers, slotted channel and threaded  
2                   rod to within 1" of support or fastener to eliminate potential injury to personnel unless  
3                   shown otherwise on the drawings. Smooth ends and install elastomeric insulation  
4                   with two coats of latex paint if exposed steel is within 6'-6" of finish floor and  
5                   presents potential injury to personnel.

6     END OF SECTION

1     **SECTION 26 05 33 - CONDUIT AND BOXES**

2     **PART 1 - GENERAL**

3     1.1    SECTION INCLUDES

- 4           A.     Rigid metallic conduit and fittings
- 5           B.     Intermediate metallic conduit and fittings
- 6           C.     Electrical metallic tubing and fittings
- 7           D.     Flexible metallic conduit and fittings
- 8           E.     Liquidtight flexible metallic conduit and fittings
- 9           F.     Rigid non-metallic conduit and fittings
- 10          G.     Wall and ceiling outlet boxes
- 11          H.     Electrical connection
- 12          I.     Pull and junction boxes
- 13          J.     Rough-ins
- 14          K.     Accessories

15    1.2    REFERENCES

- 16          A.     American National Standards Institute (ANSI):
  - 17                1.     ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated
  - 18                2.     ANSI C80.3 - Electrical Metallic Tubing, Zinc-Coated and Fittings
  - 19                3.     ANSI C80.4 - Fittings for Rigid Metal Conduit and Electrical Metallic Tubing
  - 20                4.     ANSI C80.6 – Intermediate Metal Conduit, Zinc Coated
  - 21                5.     ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and
  - 22                    Box Supports
  - 23                6.     ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and
  - 24                    Box Supports
- 25          B.     Federal Specifications (FS):
  - 26                1.     A–A–50553A – Fittings for Conduit, Metal, Rigid, (Thick-Wall and Thin-Wall
  - 27                    (EMT) Type
  - 28                2.     A–A–55810 – Specification for Flexible Metal Conduit
- 29          C.     NECA “Standards of Installation”
- 30          D.     National Electrical Manufacturers Association (NEMA):
  - 31                1.     ANSI/NEMA FB 1 – Fittings, Cast Metal Boxes, and Conduit Bodies for
  - 32                    Conduit, Electrical Metallic Tubing and Cable
  - 33                2.     RN 1 – Polyvinyl chloride (PVC) Externally Coated Galvanized Rigid Steel
  - 34                    Conduit and Intermediate Metal Conduit
  - 35                3.     TC 2 – Electrical Polyvinyl Chloride (PVC) Conduit
  - 36                4.     TC 9 – Fittings for PVC Plastic Utilities Duct for Underground Installation
- 37          E.     National Fire Protection Association (NFPA):
  - 38                1.     ANSI/NFPA 70 – National Electrical Code
- 39          F.     Underwriters Laboratories (UL): Applicable Listings
  - 40                1.     UL 1 – Flexible Metal Conduit
  - 41                2.     UL 6 – Rigid Metal Conduit
  - 42                3.     UL 360 – Liquid Tight Flexible Steel Conduit
  - 43                4.     UL514-B – Conduit Tubing and Cable Fittings

- 1 5. UL651-A – Type EB and a PVC Conduit and HDPE Conduit  
 2 6. UL651-B – Continuous Length HDPE Conduit  
 3 7. UL746A – Standard for Polymeric Materials – Short Term Property  
 4 Evaluations  
 5 8. UL797 – Electrical Metal Tubing  
 6 9. UL1242 – Intermediate Metal Conduit
- 7 G. Definitions:
- 8 1. Fittings: Conduit connection or coupling.  
 9 2. Body: Enlarged fittings with opening allowing access to the conductors for  
 10 pulling purposes only.  
 11 3. Mechanical Spaces: Enclosed areas, usually kept separated from the  
 12 general public, where the primary use is to house service equipment and to  
 13 route services. These spaces generally have exposed structures, bare  
 14 concrete and non-architecturally emphasized finishes.  
 15 4. Finished Spaces: Enclosed areas where the primary use is to house  
 16 personnel and the general public. These spaces generally have  
 17 architecturally emphasized finishes, ceilings and/or floors.  
 18 5. Concealed: Not visible by the general public. Often indicates a location  
 19 either above the ceiling, in the walls, in or beneath the floor slab, in column  
 20 coverings, or in the ceiling construction.  
 21 6. Above Grade: Not directly in contact with the earth. For example, an interior  
 22 wall located at an elevation below the finished grade shall be considered  
 23 above grade but a wall retaining earth shall be considered below grade.  
 24 7. Slab: Horizontal pour of concrete used for the purpose of a floor or  
 25 sub-floor.

## 26 PART 2 - PRODUCTS

### 27 2.1 RIGID METALLIC CONDUIT (RMC) AND FITTINGS

- 28 A. Acceptable Manufacturers:
- 29 1. Acceptable Manufacturers: Allied, LTV, Steelduct, Wheatland Tube Co, O-Z  
 30 Gedney, or approved equal.  
 31 2. Acceptable Manufacturers of RMC Conduit Fittings: Appleton Electric,  
 32 O-Z/Gedney Co., Electroline, Raco, Bridgeport, Midwest, Regal, Thomas &  
 33 Betts, Crouse-Hinds, Killark, or approved equal.
- 34 B. Minimum Size Galvanized Steel: 3/4 inch (19mm), unless otherwise noted.
- 35 C. Fittings and Conduit Bodies:
- 36 1. End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type  
 37 with provisions for mounting to form.  
 38 2. Expansion Joints: Malleable iron and hot dip galvanized providing a  
 39 minimum of 4 inches of movement. Fitting shall be watertight with an  
 40 insulating bushing and a bonding jumper.

- 1                    3.        Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with  
2                    bronze end coupling, stainless steel bands and tinned copper braid bonding  
3                    jumper. Fittings shall be watertight and concrete-tight.
- 4                    4.        Conduit End Bushings: Malleable iron type with molded-on high impact  
5                    phenolic thermosetting insulation. Where required elsewhere in the contract  
6                    documents, bushing shall be complete with ground conductor saddle and  
7                    clamp. **High impact phenolic threaded type bushings are not**  
8                    **acceptable.**
- 9                    5.        All other fittings and conduit bodies shall be of malleable iron construction  
10                    and hot dip galvanized.
- 11                  D.        PVC Externally Coated Conduit: NEMA RN 1; rigid steel conduit with external 20 40  
12                  mil PVC coating and internal galvanized surface. All fittings and conduit bodies shall  
13                  be complete with coating. Acceptable Manufacturers: Robroy, Permacote, or  
14                  approved equal.

15    2.2    INTERMEDIATE METALLIC CONDUIT (IMC) AND FITTINGS

- 16                  A.        Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted.
- 17                  B.        Acceptable Manufacturers: Allied, LTV, Steelduct, Wheatland Tube Co, O-Z  
18                  Gedney, or approved equal.
- 19                  C.        Fittings and Conduit Bodies:
- 20                    1.        End Bell Fittings: Malleable iron, hot dip galvanized, threaded flare type  
21                    with provisions for mounting to form.
- 22                    2.        Expansion Joints: Malleable iron and hot dip galvanized providing a  
23                    minimum of 4 inches of movement. Fitting shall be watertight with an  
24                    insulating bushing and a bonding jumper.
- 25                    3.        Expansion Joint for Concrete Encased Conduit: Neoprene sleeve with  
26                    bronze end coupling, stainless steel bands and tinned copper braid bonding  
27                    jumper. Fittings shall be watertight and concrete-tight.
- 28                    4.        Conduit End Bushings: Malleable iron type with molded-on high impact  
29                    phenolic thermosetting insulation. Where required elsewhere in the contract  
30                    documents, bushing shall be complete with ground conductor saddle and  
31                    clamp. **High impact phenolic threaded type bushings are not**  
32                    **acceptable.**
- 33                    5.        All other fittings and conduit bodies shall be of malleable iron construction  
34                    and hot dip galvanized.

35    2.3    ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- 36                  A.        Minimum Size Electrical Metallic Tubing: 3/4 inch, unless otherwise noted.
- 37                  B.        Acceptable Manufacturers of EMT Conduit: Allied, LTV, Steelduct, Wheatland Tube  
38                  Co, or approved equal.
- 39                  C.        Fittings and Conduit Bodies:
- 40                    1.        2" Diameter or Smaller: Compression or steel set screw type of steel  
41                    designed for their specific application.

- 1                    2.        Larger than 2": Compression type of steel designed for their specific  
2                    application.
- 3                    3.        Acceptable Manufacturers of EMT Conduit Fittings: Appleton Electric,  
4                    O-Z/Gedney Co., Electroline, Raco, Bridgeport, Midwest, Regal, Thomas &  
5                    Betts, or approved equal.
- 6    2.4    FLEXIBLE METALLIC CONDUIT (FMC) AND FITTINGS
- 7                    A.        Minimum Size Galvanized Steel: 3/4 inch, unless otherwise noted. Lighting branch  
8                    circuit wiring to an individual luminaire may be a manufactured, UL listed 3/8" flexible  
9                    metal conduit with #12 AWG THHN conductors and an insulated ground wire.
- 10                  B.        Acceptable Manufacturers: American Flex, Alflex, Electri-Flex Co, or approved  
11                  equal.
- 12                  C.        Construction: Flexible steel, approved for conduit ground, zinc coated, threadless  
13                  type formed from a continuous length of spirally wound, interlocked zinc coated strip  
14                  steel. Provide a separate equipment grounding conductor when used for equipment  
15                  where flexibility is required.
- 16                  D.        Fittings and Conduit Bodies:
- 17                    1.        Threadless hinged clamp type, galvanized zinc coated cadmium plated  
18                    malleable cast iron or screw-in type, die-cast zinc.
- 19                    2.        Fittings and conduit bodies shall include plastic or cast metal inserts  
20                    supplied by the manufacturer to protect conductors from sharp edges.
- 21                    3.        Acceptable Manufacturers: O-Z/Gedney Co., Thomas & Betts, Appleton  
22                    Electric, Electroline, Bridgeport, Midwest, Regal, or approved equal.
- 23    2.5    LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT (LFMC) AND FITTINGS
- 24                  A.        Acceptable Manufacturers: Anaconda Type UA, Electri-Flex Type LA, Alflex, Carlon  
25                  (Lamson & Sessions), or approved equal.
- 26                  B.        Construction: Flexible steel, approved for conduit ground, zinc coated, threadless  
27                  type formed from a continuous length of spirally wound, interlocked zinc coated strip  
28                  steel and an extruded PVC cover.
- 29                  C.        Fittings and Conduit Bodies:
- 30                    1.        Watertight, compression type, galvanized zinc coated cadmium plated  
31                    malleable cast iron, UL listed.
- 32                    2.        Fittings and conduit bodies shall include plastic or cast metal inserts  
33                    supplied by the manufacturer to protect conductors from sharp edges.
- 34                    3.        Acceptable Manufacturers: Appleton Electric, O-Z/Gedney Co., Electroline,  
35                    Bridgeport, Thomas & Betts, Midwest, Regal, Carlon (Lamson & Sessions),  
36                    or approved equal.
- 37    2.6    RIGID NON-METALLIC CONDUIT (RNC) AND FITTINGS
- 38                  A.        Minimum Size Rigid Smooth-Wall Nonmetallic Conduit: 3/4 inch, unless otherwise  
39                  noted.

- 1 B. Acceptable Manufacturers: Carlon (Lamson & Sessions) Type 40, Cantex, J.M.  
2 Mfg., or approved equal.
- 3 C. Construction: Schedule 40 and Schedule 80 rigid polyvinyl chloride (PVC), UL  
4 labeled for 90°C.
- 5 D. Fittings and Conduit Bodies: NEMA TC 3; sleeve type suitable for and  
6 manufactured especially for use with the conduit by the conduit manufacturer.
- 7 E. Plastic cement for joining conduit and fittings shall be provided as recommended by  
8 the manufacturer.

9 2.7 OUTLET BOXES

- 10 A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, minimum of 14  
11 gauge, with 1/2 inch male fixture studs where required.
- 12 B. Nonmetallic Outlet Boxes: ANSI/NEMA OS 2.
- 13 C. Cast Boxes: NEMA FB1, Type FD, Aluminum or cast ferrous alloy, deep type, gasketed  
14 cover, threaded hubs.
- 15 D. Outlet boxes for luminaires to be not less than 1-1/2" deep, deeper if required by the  
16 number of wires or construction. The box shall be coordinated with surface  
17 luminaires to conceal the box from view or provide a finished trim plate.
- 18 E. Switch outlet boxes for local light control switches, dimmers and occupancy sensors  
19 shall be 4 inches square by 2-1/8 inches deep, with raised cover to fit flush with  
20 finish wall line. Multiple gang switch outlets shall consist of the required number of  
21 gang boxes appropriate to the quantity of switches comprising the gang. Where  
22 walls are plastered, provide a plaster raised cover. Where switch outlet boxes occur  
23 in exposed concrete block walls, boxes shall be installed in the block cavity with a  
24 raised square edge tile cover of sufficient depth to extend out to face of block or  
25 masonry boxes.
- 26 F. Outlet boxes for telephone substations in walls and columns shall be 4 inches  
27 square and 2-1/8 inches deep with single gang raised cover to fit flush with finished  
28 wall line equipped with flush telephone plate.
- 29 G. Wall or column receptacle outlet boxes shall be 4 inches square with raised cover to  
30 fit flush with finished wall line. Boxes in concrete block walls shall be installed the  
31 same as for switch boxes in block walls.

32 2.8 **[ECONN]: ELECTRICAL CONNECTION**

- 33 A. Electrical connection to equipment and motors, sized per NEC. Coordinate  
34 requirements with contractor furnishing equipment or motor. Refer to specifications  
35 and general installation notes for terminations to motors.

36 2.9 **[JB]: PULL AND JUNCTION BOXES**

- 37 A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.
- 38 B. Sheet metal boxes larger than 12 inches in any dimension that contain terminations  
39 or components: Continuous hinged enclosure with 1/4 turn latch and white back  
40 panel for mounting terminal blocks and electrical components.

- 1 C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4  
2 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight.  
3 Galvanized cast iron box and cover with ground flange, neoprene gasket, and  
4 stainless steel cover screws.
- 5 D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, inside flanged,  
6 recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron  
7 box and plain cover with neoprene gasket and stainless steel cover screws.
- 8 E. Flanged type boxes shall be used where installed flush in wall.
- 9 2.10 ROUGH-IN
- 10 A. Provide with one (1) flush mount double gang box with single gang plaster ring and  
11 appropriate cover plate:
- 12 B. Conduit stubbed to above the lay-in ceiling.
- 13 C. **[RI-TECH]:** Technology Rough-in:
- 14 1. Rough-in shall have one (1) 1" conduit.
- 15 D. **[RI-TECH-W]:** Technology Rough-in - Wall Phone:
- 16 1. Mount on wall +54" or as noted in plans. Rough-in shall have one (1) 1"  
17 conduit.
- 18 E. **[RI-TV]:** Television Antenna Outlet Box Rough-in:
- 19 1. Rough-in shall have one (1) 3/4" conduit.
- 20 2.11 ACCESSORIES
- 21 A. Fire Rated Moldable Pads: UL #9700, moldable sheet putty at required thickness on  
22 all five sides of back boxes. Kinetics Noise Control – IsoBacker Pad, SpecSeal –  
23 SSP Putty and Pads, 3M #MPP-4S or equal.
- 24 B. Sound Barrier Insulation Pads: Mastic, non-hardening, sheet material, minimum  
25 1/8" thickness applied to all five sides of back boxes. Kinetics Noise Control –  
26 SealTight Backer Pad, L.H. DOTTIE Co., #68 or equal.

## 27 PART 3 - EXECUTION

### 28 3.1 CONDUIT SIZING

- 29 A. Size conduit as shown on the drawings and specifications. Where not indicated in  
30 the contract documents, conduit size shall be according to N.E.C. (Latest Edition).  
31 Conduit and conductor sizing shall be coordinated to limit conductor fill to less than  
32 40%, maintain conductor ampere capacity as required by the National Electrical  
33 Code (to include enlarged conductors due to temperature and quantity derating  
34 values) and to prevent excessive voltage drop and pulling tension due to long  
35 conduit/conductor lengths.
- 36 B. Minimum Conduit Size (Unless Noted Otherwise):
- 37 1. Above Grade: 3/4 inch. (The use of 1/2 inch would be allowed for  
38 installation conduit to individual light switches, individual receptacles and  
39 individual fixture whips from junction box.)

- 1                   2.       Below Grade 5' or less from Building Foundation: 3/4 inch.
- 2                   3.       Below Grade More than 5' from Building Foundation: 3/4 inch.
- 3                   4.       Telecommunication Conduit: 1 inch.
- 4                   5.       Controls Conduit: 1/2 inch.
- 5           C.       Conduit sizes shall change only at the entrance or exit to a junction box, unless
- 6                   specifically noted on the drawings.

### 7   3.2   CONDUIT ARRANGEMENT

- 8           A.       In general, conduit shall be installed concealed in walls, in finished spaces and
- 9                   where possible or practical, or as noted otherwise. In unfinished spaces, mechanical
- 10                  and utility areas, conduit may run either concealed or exposed as conditions dictate
- 11                  and as practical unless noted otherwise on drawings. Installation shall maintain
- 12                  headroom in exposed vicinities of pedestrian or vehicular traffic.
- 13           B.       Conduit shall not share the same cell as structural reinforcement in masonry walls.
- 14           C.       Conduit runs shall be routed as shown on large scale drawings. Conduit routing on
- 15                  drawings scaled 1/4"=1'-0" or less shall be considered diagrammatic, unless noted
- 16                  otherwise. The correct routing, when shown diagrammatically shall be chosen by the
- 17                  Contractor based on information in the contract documents, in accordance with
- 18                  manufacturer's written instructions, applicable codes, the NECA's "Standard of
- 19                  Installation", in accordance with recognized industry standards, and coordinated with
- 20                  other contractors.
- 21           D.       Contractor shall adapt his work to the job conditions and make such changes as
- 22                  required and permitted by the Architect/Engineer, such as moving to clear beams
- 23                  and joists, adjusting at columns, avoiding interference with windows, etc., to permit
- 24                  the proper installation of other mechanical and/or electrical equipment.
- 25           E.       Contractor shall cooperate with all Contractors on the project. He shall obtain details
- 26                  of other Contractor's work in order to ensure fit and avoid conflict. Any expense due
- 27                  to the failure of This Contractor to do so shall be paid for in full by him. The other
- 28                  trades involved as directed by the Architect/Engineer shall perform the repair of work
- 29                  damaged as a result of neglect or error by This Contractor. The resultant costs shall
- 30                  be borne by This Contractor.

### 31   3.3   CONDUIT SUPPORT

- 32           A.       Conduit runs installed above a suspended ceiling shall be properly supported. In no
- 33                  case shall conduit rest on the suspended ceiling construction, nor utilize ceiling
- 34                  support system for conduit support.
- 35           B.       Conduit shall not be supported from ductwork, water, sprinkler piping, or other non-
- 36                  structural members, unless approved by the Architect/Engineer. All supports shall be
- 37                  from structural slabs, walls, structural members, and bar joists, and coordinated with
- 38                  all other applicable contractors, unless noted otherwise.
- 39           C.       Conduit shall be held in place by the correct size of galvanized one-hole conduit
- 40                  clamps, two-hole conduit straps, patented support devices, clamp back conduit
- 41                  hangers, or by other means if called for on the drawings.
- 42           D.       Support individual horizontal raceways with separate, malleable-iron pipe hangers or
- 43                  clamps.

- 1 E. Spring-steel conduit clips specifically designed for supporting single conduits or  
2 tubing may be used in lieu of malleable-iron hangers for 1" and smaller raceways  
3 serving lighting and receptacle branch circuits above accessible ceilings and for  
4 securing raceways to slotted channel and angle supports.
- 5 F. Group conduits in parallel runs where practical and use conduit racks or trapeze  
6 hangers constructed of steel channel, suspended with threaded solid rods or wall  
7 mounted from metal channels with conduit straps or clamps. Provide space in each  
8 rack or trapeze for 25% additional conduits.
- 9 G. Do not exceed 25 lbs. per hanger and a minimum spacing of 2'-0" on center when  
10 attaching to metal roof decking (excludes concrete on metal deck). This 25 lbs. load  
11 and 2'-0" spacing include adjacent electrical and mechanical items hanging from  
12 deck. If the hanger restrictions cannot be achieved, supplemental framing off steel  
13 framing will need to be added.
- 14 H. Arrange supports in vertical runs so the weight of raceways and enclosed  
15 conductors is carried entirely by raceway supports, with no weight load on raceway  
16 terminals.
- 17 I. Supports for metallic conduit shall be no greater than 10 feet. A smaller interval may  
18 be used if necessitated by building construction, but in no event shall support spans  
19 exceed the National Electrical Code requirements. Conduit shall be securely  
20 fastened within 3 feet of each outlet box, junction box, device box, cabinet, or fitting.
- 21 J. Supports of flexible conduit shall be within 12 inches of each outlet box, junction  
22 box, device box, cabinet, or fitting and at intervals not to exceed 4.5 feet.
- 23 K. Supports for non-metallic conduit shall be at sufficiently close intervals to eliminate  
24 any sag in the conduit. The manufacturer's recommendations shall be followed, but  
25 in no event shall support spans exceed the National Electrical Code requirements.
- 26 L. Where conduit is to be installed in poured concrete floors or walls, provide  
27 concrete-tight conduit inserts securely fastened to forms to prevent conduit  
28 misplacement.
- 29 M. Finish:
- 30 1. Prime coat exposed steel hangers and supports. Hangers and supports in  
31 crawl spaces, pipe shafts, and above suspended ceiling spaces are not  
32 considered exposed.
- 33 2. Trim all ends of exposed field fabricated steel hangers, slotted channel and  
34 threaded rod to within 1" of support or fastener to eliminate potential injury to  
35 personnel unless shown otherwise on the drawings. Smooth ends and  
36 install elastomeric insulation with two coats of latex paint if exposed steel is  
37 within 6'-6" of finish floor and presents potential injury to personnel.

### 38 3.4 CONDUIT INSTALLATION

#### 39 A. Conduit Connections:

- 40 1. Shorter than standard conduit lengths shall be cut square using industry  
41 standards. The ends of all conduits cut shall be reamed or otherwise  
42 finished to remove all rough edges.
- 43 2. Metallic conduit connections in slab on grade installation shall be sealed and  
44 one coat of rust inhibitor primer applied after the connection is made.

- 1                    3.        Where conduits with tapered threads cannot be coupled with standard  
2                    couplings, then approved split or Erickson couplings shall be used. Running  
3                    threads will not be permitted.
- 4                    4.        Install expansion/deflection joints where conduit crosses structure  
5                    expansion/seismic joints.
- 6                    B.        Conduit terminations for all low voltage wiring shall have nylon bushings installed on  
7                    each end of every conduit run.
- 8                    C.        Conduit Bends:
- 9                    1.        Use a hydraulic one-shot conduit bender or factory elbows for bends in  
10                    conduit 2" in size or larger. All steel conduit bending shall be done cold; no  
11                    heating of steel conduit shall be permitted.
- 12                    2.        All bends of rigid non-metallic conduit (RNC) shall be made with the  
13                    manufacturer's approved bending equipment. The use of spot heating  
14                    devices will not be permitted (i.e. blow torches).
- 15                    3.        A run of conduit shall not contain more than the equivalent of four (4)  
16                    quarter bends (360°), including those bends located immediately at the  
17                    outlet or body.
- 18                    4.        Telecommunications conduits shall have no more than two (2) 90 degree  
19                    bends between pull points and contain no continuous sections longer than  
20                    100 feet. Insert pull points or pull boxes for conduits exceeding 100 feet in  
21                    length.
- 22                    a.        A third bend is acceptable if:
- 23                               1)        The total run is not longer than (33) feet.  
24                               2)        The conduit size is increased to the next trade size.
- 25                    5.        Telecommunications pull boxes shall not be used in lieu of a bend. Align  
26                    conduits that enter into the pull box from opposite ends with each other. Pull  
27                    box size shall be twelve (12) times the diameter of the largest conduit. Slip  
28                    sleeves or gutters can be used in place of a pull box.
- 29                    6.        Telecommunications conduit bend radius shall be six (6) times the diameter  
30                    for conduits under 2" and ten (10) times the diameter for conduits over 2".
- 31                    7.        Rigid non-metallic conduit (RNC) runs longer than 100 feet or runs which  
32                    have more than two 90° equivalent bends (regardless of length) shall use  
33                    rigid metal elbows for bends.
- 34                    8.        Use conduit bodies to make sharp changes in direction (i.e. around beams).
- 35                    D.        Conduit Placement:
- 36                    1.        Conduit shall be mechanically continuous from source of current to all  
37                    outlets. Conduit shall be electrically continuous from source of current to all  
38                    outlets, unless a properly sized grounding conductor is routed within the  
39                    conduit. All metallic conduits shall be bonded per the National Electrical  
40                    Code.

- 1  
2  
3  
4 2. Route exposed conduit and conduit above suspended ceilings (accessible or not) parallel/perpendicular to the building structural lines, and as close to building structure as possible. Wherever possible, route horizontal conduit runs above water and steam piping.
- 5  
6  
7  
8 3. Route conduit through roof openings provided for piping and ductwork where possible. If not provided or routing through provided openings is not possible, route through roof jack with pitch pocket. Coordinate roof penetrations with other trades.
- 9  
10 4. Conduits, raceway, and boxes shall not be installed in concealed locations in metal deck roofing or less than 1.5" below bottom of roof decking.
- 11  
12 5. Avoid moisture traps where possible. Where unavoidable, provide a junction box with drain fitting at conduit low point.
- 13  
14  
15  
16  
17  
18  
19 6. All conduits through walls shall be grouted or sealed into openings. Where conduit penetrates firewalls and floors, seal with a UL listed sealant. Seal penetrations with intumescent caulk, putty, or sheet installed per manufacturer's recommendations. All materials used to seal penetrations of firewalls and floors shall be tested and certified as a system per ASTM E814 Standard for fire tests or through-penetration fire stops as manufactured by 3M or approved equal.
- 20  
21  
22  
23  
24 7. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN MASONRY OR EXTERIOR WALLS UNDER THIS DIVISION. A QUALIFIED MASON AT THE EXPENSE OF THIS CONTRACTOR SHALL REPAIR ALL OPENINGS TO MATCH EXISTING CONDITIONS.
- 25  
26  
27  
28  
29 8. Seal interior of conduit at exterior entries, air handling units, coolers/freezers, etc., and where the temperature differential can potentially be greater than 20°F, to prevent moisture penetration. Seal shall be placed where conduit enters warm space. Conduit seal fitting shall be a drain/seal, with sealing compound, equal to O-Z/Gedney type EYD.
- 30  
31  
32  
33  
34 9. Conduits, if run in concrete structure, shall be in middle one-third of slab thickness, and leave at least 3" min. concrete cover. Conduits shall run parallel to each other and spaced at least 8" apart centerline to centerline. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement. Maximum conduit outside diameter 1".
- 35  
36 10. No conduits are allowed in concrete on metal deck unless expressly approved in writing by the Architect.
- 37 11. Do not route conduits across each other in slabs on grade.
- 38  
39 12. Rigid non-metallic conduit (RNC) shall be installed when material surface temperatures and ambient temperature are greater than 40°F.
- 40  
41  
42  
43  
44 13. Where rigid non-metallic conduit (RNC) conduit is used below grade, in a slab, below a slab, etc., a transition to rigid galvanized steel or PVC-coated steel conduit shall be installed before conduit exits earth. The metallic conduit shall extend a minimum of 6" into the surface concealing the non-metallic conduit.

- 1 14. Contractor shall provide suitable mechanical protection around all conduits  
2 stubbed out from floors, walls or ceilings during construction to prevent  
3 bending or damaging of stubs due to carelessness with construction  
4 equipment.
- 5 15. Contractor shall provide a polypropylene pull cord with 2000 lbs. tensile  
6 strength in each empty conduit (indoor and outdoor), except in sleeves and  
7 nipples.
- 8 16. Telecommunications conduits that protrude through the structural floor shall  
9 be installed 1 to 3" above finished floor (AFF).
- 10 17. Telecommunications conduits that enter into Telecommunications rooms  
11 below the finished ceiling shall terminate a minimum of 4" below ceiling and  
12 as close to the wall as possible.
- 13 18. Telecommunications conduits that are below grade and enter into a building  
14 shall terminate a minimum of 4" above finished floor (AFF) and as close to  
15 the wall as possible.

16 3.5 CONDUIT TERMINATIONS

- 17 A. Where conduit bonding is indicated or required in the contract documents, the  
18 bushings shall be a grounding type sized for the conduit and ground bonding  
19 conductor as manufactured by O-Z/Gedney, Appleton, Thomas & Betts, Burndy,  
20 Regal, or approved equal.
- 21 B. Conduits with termination fittings shall be threaded for one (1) lock nut on the  
22 outside and one (1) lock nut and bushing on the inside of each box.
- 23 C. Where conduits terminate in boxes with knockouts, they shall be secured to the  
24 boxes with lock nuts and provided with approved screw type tinned iron bushings or  
25 fittings with plastic inserts.
- 26 D. Where conduits terminate in boxes, fittings, or bodies with threaded openings, they  
27 shall be tightly screwed against the shoulder portion of the threaded openings.
- 28 E. Conduit terminations to all motors shall be made with flexible metallic conduit (FMC),  
29 unless noted otherwise. Final connections to roof exhaust fans, or other exterior  
30 motors and motors in damp or wet locations shall be made with liquidtight flexible  
31 metallic conduit (LFMC). Motors in hazardous areas, as defined in the National  
32 Electrical Code, shall be connected using flexible conduit rated for the environment.  
33 Flexible conduit shall not exceed 6' in length. Route equipment ground conductors  
34 from circuit ground to motor ground terminal through flexible conduit.
- 35 F. Rigid non-metallic conduit (RNC) conduit shall be terminated using fittings and  
36 bodies produced by the manufacturer of the conduit, unless noted otherwise.  
37 Prepare conduit as per manufacturer's recommendations before joining. All joints  
38 shall be solvent welded by applying full even coat of plastic cement to the entire  
39 areas that will be joined. Turn the conduit at least a quarter to one half turn in the  
40 fitting and let the joint cure for 1-hour minimum or as per the manufacturer's  
41 recommendations.
- 42 G. All conduit ends shall be sealed with plastic immediately after installation to prevent  
43 the entrance of any foreign matter during construction. The seals shall be removed  
44 and the conduits blown clear of any and all foreign matter prior to any wires or pull  
45 cords being installed.

- 1 3.6 UNDERGROUND CONDUIT INSTALLATION
- 2 A. Conduit Connections:
- 3 1. Conduit joints in a multiple conduit run shall be staggered at least one foot  
4 apart.
- 5 B. Conduit Bends (Lateral):
- 6 1. Conduits shall have long sweep radius elbows instead of standard elbows  
7 wherever special bends are indicated and noted on the drawings, or as  
8 required by the manufacturer of the equipment or system being served.
- 9 2. Telecommunications conduit bend radius shall be six times the diameter for  
10 conduits under 2" and ten times the diameter for conduits over 2". Where  
11 long cable runs are involved, sidewall pressures may require larger radius  
12 bends. Coordinate with Architect/Engineer prior to conduit installation to  
13 determine bend radius.
- 14 C. Conduit Elbows (vertical):
- 15 1. Minimum metal or RTRC elbow radiuses shall be 30 inches for primary  
16 conduits (>600V) and 18 inches for secondary conduits (<600V). Increase  
17 radius, as required, based on pulling tension calculation requirements.
- 18 D. Conduit Placement:
- 19 1. Conduit runs shall be pitched a minimum of 4" per 100 feet to drain toward  
20 the terminations. Duct runs shall be installed deeper than the minimum  
21 wherever required to avoid any conflicts with existing or new piping, tunnels,  
22 etc.
- 23 2. For parallel runs, use suitable separators and chairs installed not greater  
24 than 4' on centers. Band conduit together with suitable banding devices.  
25 Securely anchor conduit to prevent movement during concrete placement or  
26 backfilling.
- 27 3. Where concrete is required, the materials for concreting shall be thoroughly  
28 mixed to a minimum f'c = 2500 and immediately placed in the trench around  
29 the conduits. No concrete that has been allowed to partially set shall be  
30 used.
- 31 4. Before the Contractor pulls any cables into the conduit he shall have a  
32 mandrel 1/4" smaller than the conduit inside diameter pulled through each  
33 conduit and if any concrete or obstructions are found, the Contractor shall  
34 remove them and clear the conduit. Spare conduit shall also be cleared of  
35 all obstructions.
- 36 5. Conduit terminations in manholes, masonry pull boxes, or masonry walls  
37 shall be with malleable iron end bell fittings.
- 38 6. All spare conduits not terminated in a covered enclosure shall have its  
39 terminations plugged as described above.
- 40 7. Ductbanks and conduit shall be installed a minimum of 24" below finished  
41 grade, unless otherwise noted on the drawings or elsewhere in these  
42 specifications.

- 1 8. All non-metallic conduit installed underground outside of a slab shall be  
2 rigid.
- 3 E. Horizontal Directional Drilling:
- 4 1. Entire drill path shall be accurately surveyed, with entry and exit stakes  
5 placed and coordinated with other contractors. If using a magnetic guidance  
6 system, entire drill path shall be surveyed for any surface geo-magnetic  
7 variations or anomalies.
- 8 2. Any utility locates within 20 feet of the bore path shall have the exact  
9 location physically verified by hand digging or vacuum excavation. Restore  
10 inspection holes to original condition after verification.
- 11 F. Raceway Seal:
- 12 1. Where a raceway enters a building or structure, it shall be sealed with a  
13 sealing bushing or duct seal to prevent the entry of liquids or gases. Seal  
14 must be compatible with conductors and raceway system. Spare or unused  
15 raceway shall also be sealed.
- 16 2. All telecommunications conduits and innerducts, including those containing  
17 cables, shall be plugged at the building and vault with "JackMoon" or  
18 equivalent duct seal, capable of withstanding a 10 foot head of water (5  
19 PSI).
- 20 3.7 CONDUIT INSTALLATION SCHEDULE
- 21 A. In the event the location of conduit installation represents conflicting installation  
22 requirements as specified in the following schedule, a clarification shall be obtained  
23 from the Architect/Engineer. If This Contractor is unable to obtain a clarification as  
24 outlined above, concealed rigid galvanized steel conduit installed per these  
25 specifications and the National Electrical Code shall be required.
- 26 B. The following schedule shall be adhered to unless they constitute a violation of  
27 applicable codes or are noted otherwise on the drawings. The installation of RMC  
28 conduit will be permitted in place of any and all conduit specified in this schedule.
- 29 1. Exposed:
- 30 a. Branch Circuits (lighting, receptacles, controls, etc.): EMT.
- 31 b. Controls: EMT painted blue or dyed blue.
- 32 2. Finished Spaces/Concealed: EMT.
- 33 3. Wet or Damp Locations: RMC conduit, boxes and fittings, installed and  
34 equipped so as to prevent water from entering the conduit system.
- 35 4. Site Conduits:
- 36 a. Within 5' from the Exterior Perimeter of a Building Foundation:  
37 RMC conduit with a minimum of 3" thickness between the surface of  
38 the concrete and the nearest conduit. Concrete to be doweled into  
39 the foundation.
- 40 b. 5' or Greater from the Exterior Perimeter of a Building Foundation:  
41 RNC.

- 1                   5.     Interior Locations:
- 2                   a.     Exposed: EMT conduit.
- 3                   1)     Exposed Controls Conduit: EMT painted blue or dyed blue.
- 4                   b.     Concealed: EMT.
- 5                   6.     Hazardous Locations as Defined by the National Electrical Code: RMC
- 6                   conduit complete with screwed fittings and conduit seals.

7   3.8   BOX INSTALLATION SCHEDULE

- 8           A.     Galvanized steel boxes may be used in:
- 9           1.     Concealed interior locations above ceilings and in hollow studded partitions.
- 10          2.     Exposed interior locations in mechanical rooms and in rooms without
- 11          ceilings; higher than 8' above the highest platform level.
- 12          3.     Direct contact with concrete except slab on grade.
- 13          4.     Recessed in stud wall of kitchens and laundries.
- 14          B.     Cast boxes shall be used in:
- 15          1.     Exterior locations.
- 16          2.     Hazardous locations.
- 17          3.     Exposed interior locations within 8' of the highest platform level.
- 18          4.     Direct contact with earth.
- 19          5.     Direct contact with concrete in slab on grade.
- 20          6.     Wet locations.
- 21          7.     Kitchens and laundries when exposed on wall surface.

22   3.9   COORDINATION OF BOX LOCATIONS

- 23          A.     Provide electrical boxes as shown on the drawings, and as required for splices, taps,
- 24          wire pulling, equipment connections, and code compliance.
- 25          B.     Electrical box locations shown on the Contract Drawings are approximate, unless
- 26          dimensioned. Verify location of floor boxes and outlets in offices and work areas
- 27          prior to rough-in.
- 28          C.     Locate and install boxes to allow access. Avoid interferences with ductwork, piping,
- 29          structure, equipment, etc. Where installation is inaccessible, provide access doors.
- 30          Coordinate locations and sizes of required access doors with the Architect/Engineer
- 31          and General Contractor.
- 32          D.     Locate and install to maintain headroom and to present a neat appearance.
- 33          E.     Coordinate locations with Heating Contractor to avoid baseboard radiation cabinets.

34   3.10   OUTLET BOX INSTALLATION

- 35          A.     Do not install boxes back-to-back in walls.
- 36          1.     Provide a minimum horizontal separation of 6 inches between boxes
- 37          installed on opposite sides of non-rated stud walls. When the minimum
- 38          separation cannot be maintained, install sound insulation pads on all five
- 39          sides of the back box in accordance with the manufacturer's instructions.

- 1                    2.        Provide a minimum horizontal separation of 24 inches between boxes  
2                    installed on opposite sides of fire-rated walls. When the minimum  
3                    separation cannot be maintained, install fire-rated moldable pads to all five  
4                    sides of the back box to maintain the fire rating of the wall. Install moldable  
5                    pads in accordance with UL listing for the specific product. Sound insulation  
6                    pads are not acceptable for use in fire-rated wall applications unless the  
7                    product carries the necessary fire rating.
- 8                    B.        Install sound insulation pads on all five sides of the back of all boxes in sound-rated  
9                    wall assemblies. Sound-rated wall assemblies are defined as partition types  
10                    carrying a Sound Transmission Class (STC) rating.
- 11                    C.        The Contractor shall anchor switch and outlet box to wall construction so that it is  
12                    flush with the finished masonry, paneling, drywall, plaster, etc. The Contractor shall  
13                    check the boxes as the finish wall surface is being installed to assure that the box is  
14                    flush. (Provide plaster rings as necessary.)
- 15                    D.        Mount at heights shown or noted on the drawings or as generally accepted if not  
16                    specifically noted.
- 17                    E.        Locate boxes in masonry walls to require cutting of masonry unit corner only.  
18                    Coordinate masonry cutting to achieve neat openings for boxes.
- 19                    F.        Provide knockout closures for unused openings.
- 20                    G.        Support boxes independently of conduit.
- 21                    H.        Use multiple-gang boxes where more than one device are mounted together; do not  
22                    use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- 23                    I.        Install boxes in walls without damaging wall insulation.
- 24                    J.        Coordinate mounting heights and locations of outlets mounted above counters,  
25                    benches, backsplashes, and below baseboard radiation.
- 26                    K.        Position outlets to locate luminaires as shown on reflected ceiling drawings.
- 27                    L.        In inaccessible ceiling areas, position outlets and junction boxes within 6 inches of  
28                    recessed luminaire, to be accessible through luminaire ceiling opening.
- 29                    M.        Provide recessed outlet boxes in finished areas; secure boxes to interior wall and  
30                    partition studs, accurately positioned to allow for surface finish thickness. Use  
31                    stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel  
32                    channel fasteners for flush ceiling outlet boxes.
- 33                    N.        Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- 34                    O.        Provide cast outlet boxes in exterior locations and wet locations, and where exposed  
35                    rigid or intermediate conduit is used.
- 36    3.11    FLOOR BOX INSTALLATION
- 37                    A.        Set boxes level and flush with finish flooring material.
- 38                    B.        Use cast iron floor boxes for installations in slab on grade. Trim shall match floor  
39                    covering to be used.
- 40                    C.        Provide a minimum horizontal offset of 24 inches between boxes.

## 1 3.12 PULL AND JUNCTION BOX INSTALLATION

- 2 A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished  
3 areas.
- 4 B. Support pull and junction boxes independent of conduit.
- 5 C. Do not install boxes back-to-back in walls.
- 6 1. Provide a minimum horizontal separation of 6 inches between boxes  
7 installed on opposite sides of non-rated stud walls. When the minimum  
8 separation cannot be maintained, install sound insulation pads on all five  
9 sides of the back box in accordance with the manufacturer's instructions.
- 10 2. Provide a minimum horizontal separation of 24 inches between boxes  
11 installed on opposite sides of fire-rated walls. When the minimum  
12 separation cannot be maintained, install fire-rated moldable pads to all five  
13 sides of the back box to maintain the fire rating of the wall. Install moldable  
14 pads in accordance with UL listing for the specific product. Sound insulation  
15 pads are not acceptable for use in fire-rated wall applications unless the  
16 product carries the necessary fire rating.
- 17 D. Install sound insulation pads on all five sides of the back of all boxes in sound-rated  
18 wall assemblies. Sound-rated wall assemblies are defined as partition types  
19 carrying a Sound Transmission Class (STC) rating.

## 20 3.13 EXPOSED BOX INSTALLATION

- 21 A. Boxes shall be secured to the building structure with proper size screws, bolts,  
22 hanger rods, or structural steel elements.
- 23 B. On brick, block and concrete walls or ceilings, exposed boxes shall be supported  
24 with no less than two (2) Ackerman-Johnson, Paine, Phillips, or approved equal  
25 screw anchors or expansion shields and round head machine screws. Cast boxes  
26 shall not be drilled.
- 27 C. On steel structures, exposed boxes shall be supported to the steel member by  
28 drilling and tapping the member and fastening the boxes by means of round head  
29 machine screws.
- 30 D. Boxes may be supported on steel members by APPROVED beam clamps if conduit  
31 is supported by beam clamps.
- 32 E. Boxes shall be fastened to wood structures by means of a minimum of two (2) wood  
33 screws adequately large and long to properly support. (Quantity depends on size of  
34 box.)
- 35 F. Wood, plastic, or fiber plugs shall not be used for fastenings.
- 36 G. Explosive devices shall not be used unless specifically allowed.

37 END OF SECTION

1     **SECTION 26 05 53 - ELECTRICAL IDENTIFICATION**

2     **PART 1 - GENERAL**

3     1.1    SECTION INCLUDES

- 4           A.     Nameplates and tape labels
- 5           B.     Wire and cable markers
- 6           C.     Conduit labeling
- 7           D.     Conduit color coding
- 8           E.     Conductor color coding
- 9           F.     Electrical gear labeling
- 10          G.     Power distribution equipment labeling
- 11          H.     Transformer equipment labeling
- 12          I.     Series rating identification
- 13          J.     Pole identification

14    1.2    REFERENCES

- 15          A.     ANSI C2 – National Electrical Safety Code
- 16          B.     NFPA 70 – National Electrical Code
- 17          C.     ANSI A13.1 – Standard for Pipe Identification
- 18          D.     ANSI Z535.4 – Standard for Product Safety Signs and Labels

19    **PART 2 - PRODUCTS**

20    2.1    ELECTRICAL IDENTIFICATION PRODUCTS

- 21          A.     Colored Adhesive Marking Tape for banding Raceways, Wires, and Cables: Self-  
22                 adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.
- 23          B.     Pretensioned Flexible Wraparound Colored Plastic Sleeves for Cable Identification:  
24                 flexible acrylic bands sized to suit the cable diameter and arranged to stay in place  
25                 by pre-tensioned gripping action when coiled around the cable.
- 26          C.     Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive,  
27                 wraparound, cable/conductor markers with preprinted numbers and letter.
- 28          D.     Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties,  
29                 0.18-inch minimum width, 50-lb minimum tensile strength, and suitable for a  
30                 temperature range from minus 50°F to 350°F. Provide ties in specified colors when  
31                 used for color coding.
- 32          E.     Underground Plastic Markers: Bright colored continuously printed plastic ribbon tape  
33                 of not less than 6 inches wide by 4 mil thick, printed legend indicating type of  
34                 underground line, manufactured for direct burial service. Tape shall contain a  
35                 continuous metallic wire to allow location with a metal detector.
- 36          F.     Aluminum, Wraparound Marker Bands: 1" in width, .014 inch thick aluminum bands  
37                 with stamped or embossed legend, and fitted with slots or ears for permanently  
38                 securing around wire or cable jacket or around groups of conductors.
- 39          G.     Brass or aluminum Tags: 2" by 2" by .05-inch metal tags with stamped legend,  
40                 punched for fastener.

- 1 H. Indoor/Outdoor Number and Letters: Outdoor grade vinyl label, minimum of 3/4" high  
2 x 9/16" wide, with acrylic adhesive designed for permanent application in severe  
3 indoor and outdoor environments.
- 4 2.2 NAMEPLATES AND SIGNS
- 5 A. Engraved, Plastic-Laminated Labels, Signs and Instruction Plates: Engraving stock  
6 melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 square  
7 inches, or 8 inches in length; 1/8 inch thick for larger sizes. Labels shall be punched  
8 for mechanical fasteners. Engraving legend shall be as follows:
- 9 1. Black letters on white face for normal power.
- 10 2. White letters on red face for emergency power.
- 11 3. White letters on green face for grounding.
- 12 4. Black letter on yellow face for Caution or UPS.
- 13 B. Baked-Enamel Signs for interior Use: Preprinted aluminum signs, punched, or  
14 drilled for fasteners, with colors, legend, and size required for application. Mounting  
15 ¼" grommets in corners.
- 16 C. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted,  
17 cellulose-acetate butyrate signs with .0396 inch galvanized-steel backing; and with  
18 colors, legend, and size required for application. Mounting ¼" grommets in corners.
- 19 D. Safety Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145.
- 20 E. Fasteners for Plastic-Laminated Signs; Self-tapping stainless steel screws or  
21 number 10/32 stainless steel machine screws with nuts and flat and lock washers.

## 22 PART 3 - EXECUTION

### 23 3.1 INSTALLATION

- 24 A. Lettering and Graphics: Coordinate names, abbreviations, colors, and other  
25 designations used in electrical identification work with corresponding designations  
26 specified or indicated. Install numbers, lettering, and colors as required by code.
- 27 B. Install identification devices in accordance with manufacturer's written instruction  
28 and requirements of NEC.
- 29 C. Sequence of Work: Where identification is to be applied to surfaces that require  
30 finish, install identification after completion of finish work. All mounting surfaces  
31 shall be cleaned and degreased prior to identification installation.
- 32 D. Identify Junction, Pull and Connection Boxes: Labeling shall be 3/8-inch Kroy tape or  
33 permanent magic marker (color coded), neatly hand printed. In rooms that are  
34 painted out, provide labeling on inside of cover.
- 35 E. Circuit Identification: Tag or label conductors as follows:
- 36 1. Multiple Power or Lighting Circuits in Same Enclosure: Where multiple  
37 branch circuits are terminated or spliced in a box or enclosure, label each  
38 conductor with source and circuit number.



- 1                    2.        For other wiring, indicate system type and description of wiring ("FIRE  
2                    ALARM NAC #1").
- 3                    B.        Box covers shall be painted to correspond with system type as follows:
- 4                    1.        Fire Alarm: Red  
5                    2.        Orange  
6                    3.        Optional Emergency Branch: Yellow  
7                    4.        Temperature Control/Building Automation: Blue
- 8                    3.4       CONDUCTOR COLOR CODING
- 9                    A.        Color coding shall be applied at all panels, switches, junction boxes, pull boxes,  
10                    vaults, manholes etc., where the wires and cables are visible and terminations are  
11                    made. The same color coding shall be used throughout the entire electrical system,  
12                    therefore maintaining proper phasing throughout the entire project.
- 13                    B.        Where more than one nominal voltage system exists in a building or facility, the  
14                    identification of color coding used in the panelboard or equipment shall be  
15                    permanently posted on the interior of the door or cover.
- 16                    C.        All wires and cables, 6 AWG or larger, used in motor circuits, main feeders,  
17                    sub-main feeders and branch circuits, shall be coded by the application of plastic  
18                    tape. The tape shall be 3-M, Plymouth or Permacel, in colors specified below. The  
19                    tape shall be applied at each conductor termination with two 1-inch tape bands at 6-  
20                    inch centers. Contractor option to use colored cabling in lieu of the tape at each end  
21                    for conductor 6 AWG to 500 KCM.
- 22                    D.        Wire and cables smaller than 6 AWG shall be color coded by the manufacturer.
- 23                    E.        Colored cable ties shall be applied in groups of three ties of specified color to each  
24                    conductor at each terminal or splice point starting 3 inches from the termination and  
25                    spaced at 3- inches centers. Tighten to a snug fit, and cut off excess length.
- 26                    F.        Where more than one nominal voltage system exists in a building or facility, each  
27                    ungrounded conductor of a multi-wire branch circuit, where accessible, shall be  
28                    identified by phase and system.
- 29                    G.        Conductors shall be color coded as follows:
- 30                    1.        120/240 Volt, 3-Wire:
- 31                               a.        A-Phase – Black  
32                               b.        B-Phase – Red  
33                               c.        Neutral – White  
34                               d.        Ground Bond – Green
- 35                    2.        208Y/120 Volt, 4-Wire:
- 36                               a.        A-Phase – Black  
37                               b.        B-Phase – Red  
38                               c.        C-Phase – Blue  
39                               d.        Neutral – White  
40                               e.        Ground Bond – Green
- 41                    3.        480Y/277 Volt, 4-Wire:
- 42                               a.        A-Phase – Brown  
43                               b.        B-Phase – Orange

- 1 c. C-Phase – Yellow
- 2 d. Neutral – Gray
- 3 e. Ground Bond – Green
  
- 4 4. 120 Volt, 2-Wire Isolated (Ungrounded) Power System:
  - 5 a. A-Phase – Orange
  - 6 b. B-Phase – Brown
  - 7 c. Ground Reference – Green
  
- 8 5. 120/208 Volt, 3-Wire, Isolated (Ungrounded) Power System:
  - 9 a. A-Phase – Orange with distinctive colored stripe other than white,  
10 green or gray
  - 11 b. B-Phase – Brown with distinctive colored stripe other than white,  
12 green or gray
  - 13 c. C-Phase – Yellow with distinctive colored stripe other than white,  
14 green or gray
  - 15 d. Ground Reference – Green
  
- 16 3.5 ELECTRICAL GEAR LABELING
  
- 17 A. Exterior electrical gear shall be identified with vinyl label names and numbers to be  
18 visible on the exterior of the gear. The labels shall correspond to the 1-line  
19 nomenclature and identify each cubicle of multi-section gear.
  
- 20 END OF SECTION

1 **SECTION 28 05 00 - BASIC ELECTRONIC SAFETY AND SECURITY SYSTEM**  
2 **REQUIREMENTS**

3 **PART 1 - GENERAL**

4 1.1 SECTION INCLUDES

5 A. Basic Safety and Security System Requirements (herein referred to Security)  
6 specifically applicable to Division 28 sections, in addition to Division 1 - Basic  
7 Requirements.

8 1.2 SCOPE OF WORK

9 A. This Specification and the accompanying drawings govern the work involved in  
10 furnishing, installing, testing and placing into satisfactory operation the security  
11 systems as shown on the drawings and specified herein.

12 B. Each Contractor shall provide all new materials as indicated in the schedules on the  
13 drawings, and/or in these specifications, and all items required to make their portion  
14 of the security systems a finished and working system.

15 C. Description of systems include but are not limited to the following:

16 1. Electronic Access Control System

17 2. Low Voltage Security Wiring (less than +120VAC) as specified and required  
18 for proper system control and communications.

19 3. All associated electrical backboxes, conduit, miscellaneous cabling, and  
20 power supplies required for proper system installation and operation as  
21 defined in the "Suggested Matrix of Scope Responsibility".

22 4. Firestopping of penetrations of fire-rated construction as described in  
23 Specification Section 28 05 03.

24 1.3 OWNER FURNISHED PRODUCTS

25 A. Mortise cylinders for key switches.

26 B. Electronic access control credentials.

27 1.4 WORK SEQUENCE

28 A. All construction work that will produce excessive noise levels and interference with  
29 normal building operations, as determined by the Owner, shall be scheduled with the  
30 Owner. It may be necessary to schedule such work during non-occupied hours.  
31 The Owner shall reserve the right to set policy as to when restricted construction  
32 hours will be required.

33 1.5 ALTERNATES

34 A. Base Bid: Unit 'D' Security Door operation as indicated within Construction  
35 Documents.

36 B. Alternate No. 1: Unit 'D' Exterior Patio as indicated within Construction Documents.

37 C. Alternate No. 2: Unit 'C' Security Door operation as indicated within Construction  
38 Documents and refer to details of Building 'D' to be similar at Building 'C'.

1 D. Alternate No. 3: Unit 'C' Exterior Patio as indicated within Construction Documents  
2 and refer to details of Building 'D' to be similar at Building 'C'.

3 1.6 DIVISION OF WORK BETWEEN ELECTRICAL AND SECURITY CONTRACTORS

4 A. Division of work is the responsibility of the Prime Contractor. Any scope of work  
5 described in the contract document shall be sufficient for including said requirement  
6 in the project. The Prime Contractor shall be solely responsible for determining the  
7 appropriate subcontractor for the described scope. In no case shall the project be  
8 assessed an additional cost for scope that is described in the contract documents.  
9 The following division of responsibility is a guideline based on typical industry  
10 practice.

11 B. Definitions:

12 1. "Electrical Contractor" as referred to herein refers to the Contractors listed in  
13 Division 26 of this Specification.

14 2. "Electrical Contractor" shall also refer to the Contractor listed in Division 28  
15 of this specification when the "Suggested Matrix of Scope Responsibility"  
16 indicates the work shall be provided by the EC. Refer to the Contract  
17 Documents for the "Suggested Matrix of Scope Responsibility".

18 3. "Security Contractor" as referred to herein refers to the Contractors listed in  
19 Division 28 of this Specification.

20 4. Low Voltage Security Wiring: The wiring (less than 120VAC) associated  
21 with the Security Systems, used for analog and/or digital signals between  
22 equipment.

23 C. General:

24 1. The purpose of these Specifications is to outline typical Electrical and  
25 Security Contractor's work responsibilities as related to Security Systems  
26 including conduit, J-hooks, power wiring, and Low Voltage Security Wiring.  
27 The Prime Contractor is responsible for all divisions of work.

28 2. The exact wiring requirements for much of the equipment cannot be  
29 determined until the systems have been purchased and submittals are  
30 approved. Therefore, only known wiring, conduits, raceways, and electrical  
31 power as related to such items is shown on the Security Drawings. Other  
32 wiring, conduits, raceways, junction boxes, and electrical power not shown  
33 on the Security Drawings but required for the successful operation of the  
34 systems shall be the responsibility of the Security Contractor and included in  
35 the Contractor's bid.

36 3. Where the Electrical Contractor is required to install conduit, conduit  
37 sleeves, and/or power connections in support of Security systems, the final  
38 installation shall not begin until a coordination meeting between the  
39 Electrical Contractor and the Security Contractor has convened to determine  
40 the exact location and requirements of the installation.

1 4. This Contractor shall establish Electrical and Security utility elevations prior  
 2 to fabrication and installation. The Security Contractor shall cooperate with  
 3 the Electrical Contractor and the determined elevations in accordance with  
 4 the guidelines below. This Contractor shall coordinate utility elevations with  
 5 other trades. When a conflict arises, priority shall be as follows:

- 6 a. Lighting Fixtures
- 7 b. Gravity Flow Piping, including Steam and Condensate
- 8 c. Sheet Metal
- 9 d. Electrical Busduct
- 10 e. Cable Trays, including 12" access space
- 11 f. Sprinkler Piping and other Piping
- 12 g. Conduit and Wireway
- 13 h. Open Cabling

14 D. Electrical Contractor's Responsibility:

- 15 1. Assumes all responsibility for all required conduit and power connections  
 16 when shown on the "Suggested Matrix of Scope Responsibility" to be  
 17 provided by the Electrical Contractor.
- 18 2. Responsible for Security Systems grounding and bonding.
- 19 3. This Contractor is responsible for coordination of utilities with all other  
 20 Contractors. If any field coordination conflicts are found, the Contractor shall  
 21 coordinate with other Contractors to determine a viable layout.

22 E. Security Contractor's Responsibility:

- 23 1. Assumes all responsibility for the Low Voltage Security Wiring of all  
 24 systems, including cable support where open cable is specified.
- 25 2. Assumes all responsibility for all required backboxes, conduit, and power  
 26 connections not specifically shown as being provided by the Electrical  
 27 Contractor on the "Suggested Matrix of Scope Responsibility."
- 28 3. Responsible for providing the Electrical Contractor with the required  
 29 grounding lugs or other hardware for each piece of Security equipment  
 30 which is required to be bonded to the telecommunications ground system.
- 31 4. This Contractor is responsible for coordination of utilities with all other  
 32 Contractors. If any field coordination conflicts are found, the Contractor shall  
 33 coordinate with other Contractors to determine a viable layout.

34 1.7 QUALITY ASSURANCE

35 A. Qualifications:

- 36 1. Only products of reputable manufacturers as determined by the  
 37 Architect/Engineer will be acceptable.
- 38 2. Each Contractor and their subcontractors shall employ only workers who are  
 39 skilled in their respective trades and fully trained. All workers involved in the  
 40 installation, termination, testing, and placing into operation electronic  
 41 security devices shall be individually trained by the manufacturer.
- 42 3. The Contractor shall be experienced in all aspects of this work.

- 1 4. The Contractor shall own and maintain tools and equipment necessary for  
2 successful installation and testing of electronic security devices and have  
3 personnel adequately trained in the use of such tools and equipment.
  
- 4 B. Compliance with Codes, Laws, Ordinances:
  - 5 1. This Contractor shall conform to all requirements of the Town of Verona,  
6 Wisconsin Codes, Laws, Ordinances, and other regulations having  
7 jurisdiction over this installation.
  - 8 2. In the event there are no local codes having jurisdiction over this job, the  
9 current issue of the National Electrical Code shall be followed.
  - 10 3. If there is a discrepancy between the codes and regulations having  
11 jurisdiction over this installation and these specifications, the codes and  
12 regulations shall determine the method or equipment used.
  - 13 4. If the Contractor notes, at the time of bidding, any parts of the drawings and  
14 specifications which are not in accordance with the applicable codes or  
15 regulations, he shall inform the Architect/Engineer in writing, requesting a  
16 clarification. If there is insufficient time to follow this procedure, he shall  
17 submit, with the proposal, a separate price required to make the system  
18 shown on the drawings comply with the codes and regulations.
  - 19 5. All changes to the system made after the letting of the contract in order to  
20 comply with the applicable codes or the requirements of the Inspector shall  
21 be made by the Contractor without cost to the Owner.
  
- 22 C. Permits, Fees, Taxes, Inspections:
  - 23 1. Procure all applicable permits and licenses.
  - 24 2. Abide by all applicable laws, regulations, ordinances, and other rules of the  
25 State or Political Subdivision wherein the work is done, or as required by  
26 any duly constituted public authority.
  - 27 3. Pay all applicable charges for such permits or licenses that may be required.
  - 28 4. Pay all applicable fees and taxes imposed by the State, Municipal and/or  
29 other regulatory bodies.
  - 30 5. Pay all charges arising out of required inspections due to codes, permits,  
31 licenses, or as otherwise may be required by an authorized body.
  - 32 6. Pay all charges arising out of required contract document reviews  
33 associated with the project and as initiated by the Owner or authorized  
34 independent agency/consultant.
  - 35 7. All equipment and materials shall be as approved or listed by the following:  
36 (Unless approval or listing is not applicable to an item by all acceptable  
37 manufacturers.)
    - 38 a. Factory Mutual
    - 39 b. Underwriters' Laboratories, Inc.

- 1 D. Examination of Drawings:
- 2 1. The drawings for the Security Systems work are diagrammatic, intended to  
3 convey the scope of the work and to indicate the general arrangements and  
4 locations of equipment, etc. and the approximate sizes of equipment.
- 5 2. Contractor shall determine the exact locations of equipment and the exact  
6 routing of cabling so as to best fit the layout of the job. Scaling of the  
7 drawings will not be sufficient or accurate for determining this layout. Where  
8 a specific route is required, such route will be indicated on the drawings.
- 9 3. Where job conditions require reasonable changes in indicated arrangements  
10 and locations, such changes shall be made by the Contractor at no  
11 additional cost to the Owner.
- 12 4. If an item is either shown on the drawings, called for in the specifications, or  
13 required for proper operation of the system, it shall be considered sufficient  
14 for including same in this contract.
- 15 5. The determination of quantities of material and equipment required shall be  
16 made by the Contractor from the drawings. Schedules on the drawings and  
17 in the specifications are completed as an aid to the Contractor but, where  
18 discrepancies arise, the greater number shall govern.
- 19 6. Where words "provide", "install", or "furnish" are used on the drawings or in  
20 the specifications, it shall be taken to mean to furnish, install, terminate, and  
21 make completely ready for operation the items mentioned.
- 22 E. Electronic Media/Files:
- 23 1. Construction drawings for this project have been prepared utilizing AutoCAD  
24 MEP.
- 25 2. Contractors and Subcontractors may request electronic media files of the  
26 contract drawings and/or copies of the specifications. Specifications will be  
27 provided in PDF format.
- 28 3. Upon request for electronic media, the Contractor shall complete and return  
29 a signed "Electronic File Transmittal" form provided by KJWW.
- 30 4. If the information requested includes floor plans prepared by others, the  
31 Contractor will be responsible for obtaining approval from the appropriate  
32 Design Professional for use of that part of the document.
- 33 5. The electronic contract documents can be used for preparation of shop  
34 drawings and as-built drawings only. The information may not be used in  
35 whole or in part for any other project.
- 36 6. The drawings prepared by KJWW for bidding purposes may not be used  
37 directly for ductwork layout drawings or coordination drawings.
- 38 7. The use of these CAD documents by the Contractor does not relieve them  
39 from their responsibility for coordination of work with other trades and  
40 verification of space available for the installation.
- 41 8. The information is provided to expedite the project and assist the Contractor  
42 with no guarantee by KJWW as to the accuracy or correctness of the  
43 information provided. KJWW accepts no responsibility or liability for the  
44 Contractor's use of these documents.

- 1 F. Field Measurements:
- 2 1. Before ordering any materials, this Contractor shall verify all pertinent
- 3 dimensions at the job site and be responsible for their accuracy.

4 1.8 SUBMITTALS

- 5 A. Submittals shall be required for the following items, and for additional items where
- 6 required elsewhere in the specifications or on the drawings.

- 7 1. Submittals list:

<u>Referenced Specification Section</u>	<u>Submittal Item</u>
28 05 03	Through-Penetration Firestopping
28 05 26	Electronic Safety and Security System Bonding
28 13 00	Electronic Access Control

- 8 B. General Submittal Procedures: In addition to the provisions of Division 1, the
- 9 following are required:

- 10 1. Transmittal: Each transmittal shall include the following:

- 11 a. Date
- 12 b. Owner's Project title and number
- 13 c. Contractor's name and address
- 14 d. Division of work (e.g., plumbing, heating, ventilating, etc.)
- 15 e. Description of items submitted and relevant specification number
- 16 f. Notations of deviations from the contract documents
- 17 g. Other pertinent data

- 18 2. Submittal Cover Sheet: Each submittal shall include a cover sheet
- 19 containing:

- 20 a. Date
- 21 b. Owner's Project title and number
- 22 c. Architect/Engineer
- 23 d. Contractor and subcontractors' names and addresses
- 24 e. Supplier and manufacturer's names and addresses
- 25 f. Division of work (e.g., plumbing, heating, ventilating, etc.)
- 26 g. Description of item submitted (using project nomenclature) and
- 27 relevant specification number
- 28 h. Notations of deviations from the contract documents
- 29 i. Other pertinent data
- 30 j. Provide space for Contractor's review stamps

- 31 3. Composition:

- 32 a. Submittals shall be submitted using specification sections and the
- 33 project nomenclature for each item.
- 34 b. Individual submittal packages shall be prepared for items in each
- 35 specification section. All items within a single specification section
- 36 shall be packaged together where possible. An individual submittal
- 37 may contain items from multiple specifications sections if the items
- 38 are intimately linked (e.g., pumps and motors).
- 39 c. All sets shall contain an index of the items enclosed with a general
- 40 topic description on the cover.

- 1 4. Content: Submittals shall include all fabrication, erection, layout, and setting  
2 drawings; manufacturers' standard drawings; schedules; descriptive  
3 literature, catalogs and brochures; performance and test data; wiring and  
4 control diagrams; dimensions; shopping and operating weights; shipping  
5 splits; service clearances; and all other drawings and descriptive data of  
6 materials of construction as may be required to show that the materials,  
7 equipment or systems and the location thereof conform to the requirements  
8 of the contract documents.
- 9 5. Contractor's Approval Stamp:
- 10 a. The Contractor shall thoroughly review and approve all shop  
11 drawings before submitting them to the Architect/Engineer. The  
12 Contractor shall stamp, date and sign each submittal certifying it has  
13 been reviewed.
- 14 b. Unstamped submittals will be rejected.
- 15 c. The Contractor's review shall include, but not be limited to,  
16 verification of the following:
- 17 1) Only approved manufacturers are used.  
18 2) Addenda items have been incorporated.  
19 3) Catalog numbers and options match those specified.  
20 4) Performance data matches that specified.  
21 5) Electrical characteristics and loads match those specified.  
22 6) Equipment connection locations, sizes, capacities, etc. have  
23 been coordinated with other affected trades.  
24 7) Dimensions and service clearances are suitable for the  
25 intended location.  
26 8) Equipment dimensions are coordinated with support steel,  
27 housekeeping pads, openings, etc.  
28 9) Constructability issues are resolved (e.g., weights and  
29 dimensions are suitable for getting the item into the building  
30 and into place, sinks fit into countertops, etc.).
- 31 d. The Contractor shall review, stamp and approve all subcontractors'  
32 submittals as described above.
- 33 e. **The Contractor's approval stamp is required on all submittals. Approval will indicate the Contractor's review of all material and a complete understanding of exactly what is to be furnished. Contractor shall clearly mark all deviations from the contract documents on all submittals. If deviations are not marked by the Contractor, then the item shall be required to meet all drawing and specification requirements.**
- 40 6. Submittal Identification and Markings:
- 41 a. The Contractor shall clearly mark each item with the same  
42 nomenclature applied on the drawings or in the specifications.
- 43 b. The Contractor shall clearly indicate the size, finish, material, etc.
- 44 c. Where more than one model is shown on a manufacturer's sheet,  
45 the Contractor shall clearly indicate exactly which item and which  
46 data is intended.

- 1 d. All marks and identifications on the submittals shall be  
2 unambiguous.
- 3 7. Schedule submittals to expedite the project. Coordinate submission of  
4 related items.
- 5 8. Identify variations from the contract documents and product or system  
6 limitations that may be detrimental to the successful performance of the  
7 completed work.
- 8 9. Reproduction of contract documents alone is not acceptable for submittals.
- 9 10. Incomplete submittals will be rejected without review. Partial submittals will  
10 only be reviewed with prior approval from the Architect/Engineer.
- 11 11. Submittals not required by the contract documents may be returned without  
12 review.
- 13 12. The Architect/Engineer's responsibility shall be to review one set of shop  
14 drawing submittals for each product. If the first submittal is incomplete or  
15 does not comply with the drawings and/or specifications, the Contractor  
16 shall be responsible to bear the cost for the Architect/Engineer to recheck  
17 and handle the additional shop drawing submittals.
- 18 13. Submittals shall be reviewed and approved by the Architect/Engineer  
19 **before** releasing any equipment for manufacture or shipment.
- 20 14. Contractor's responsibility for errors, omissions, or deviation from the  
21 contract documents in submittals is not relieved by the Architect/Engineer's  
22 approval.
- 23 C. Electronic Submittal Procedures:
  - 24 1. Distribution: Email submittals as attachments to all parties designated by the  
25 Architect/Engineer, unless a web-based submittal program is used.
  - 26 2. Transmittals: Each submittal shall include an individual electronic letter of  
27 transmittal.
  - 28 3. Format: Electronic submittals shall be in PDF format only. Clear and legible  
29 scanned copies, in PDF format, of paper originals are acceptable.  
30 Submittals that are not clear and legible will be rejected. Do not set any  
31 permission restrictions on files; protected, locked, or secured documents will  
32 be rejected.
  - 33 4. File Names: Electronic submittal file names shall include the relevant  
34 specification section number followed by a description of the item submitted,  
35 as follows. Where possible, include the transmittal as the first page of the  
36 PDF instead of using multiple electronic files.
    - 37 a. Submittal file name: 28 XX XX.description.YYYYMMDD
    - 38 b. Transmittal file name: 28 XX XX.description.YYYYMMDD
  - 39 5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger  
40 files shall be transmitted via a pre-approved method.

41 1.9 SCHEDULE OF VALUES

- 42 A. The requirements herein are in addition to the provisions of Division 1.

- 1 B. Format:
- 2 1. Use AIA Document Continuation Sheets G703 or another similar form
- 3 approved by the Owner and Architect/Engineer.
- 4 2. Submit in Excel format.
- 5 3. Support values given with substantiating data.
- 6 C. Preparation:
- 7 1. Itemize the cost for each of the following:
- 8 a. Overhead and profit.
- 9 b. Bonds.
- 10 c. Insurance.
- 11 d. General Requirements: Itemize all requirements.
- 12 2. Itemize work required by each specification section and list all providers. All
- 13 work provided by subcontractors and major suppliers shall be listed on the
- 14 Schedule of Values. List each subcontractor and supplier by company
- 15 name.
- 16 a. Contractor's own labor forces.
- 17 b. All subcontractors.
- 18 c. All major suppliers of products or equipment.
- 19 3. Break down all costs into:
- 20 a. Material: Delivered cost of product with taxes paid.
- 21 b. Labor: Labor cost, excluding overhead and profit.
- 22 4. For each line item having an installed cost of more than \$5,000, break down
- 23 costs to list major products or operations under each item. At a minimum,
- 24 provide material and labor cost line items for the following:
- 25 a. Access Control
- 26 D. Update Schedule of Values when:
- 27 1. Indicated by Architect/Engineer.
- 28 2. Change of subcontractor or supplier occurs.
- 29 3. Change of product or equipment occurs.

30 1.10 CHANGE ORDERS

- 31 A. A detailed material and labor takeoff shall be prepared for each change order, along
- 32 with labor rates and markup percentages. Change orders with inadequate
- 33 breakdown will be rejected.
- 34 B. Change order work shall not proceed until authorized.

35 1.11 PRODUCT DELIVERY, STORAGE, HANDLING & MAINTENANCE

- 36 A. Exercise care in transporting and handling to prevent damage to fixtures, equipment,
- 37 and materials.
- 38 B. Store materials on the site so as to prevent damage.
- 39 C. Keep fixtures, equipment, and materials clean, dry and free from harmful conditions.

1 1.12 WARRANTY

2 A. At a minimum, provide a one (1) year warranty for all equipment, materials, and  
3 workmanship. Individual specifications sections within Division 28 may require  
4 additional warranty requirements for specific equipment or systems.

5 B. The warranty period for the entire installation described in this Division of the  
6 specifications shall commence on the date of substantial completion unless a whole  
7 or partial system or any separate piece of equipment or component is put into use  
8 for the benefit of any party other than the installing contractor with prior written  
9 authorization. In this instance, the warranty period shall commence on the date  
10 when such whole system, partial system, or separate piece of equipment or  
11 component is placed in operation and accepted in writing by the Owner or their  
12 representative.

13 C. Warranty requirements shall extend to correction, without cost to the final user, of all  
14 work and/or equipment found to be defective or nonconforming to the contract  
15 documents. The Contractor shall bear the cost of correcting all damage resulting  
16 from such defects or nonconformance with contract documents exclusive of repairs  
17 required as a result of improper maintenance or operation, or of normal wear as  
18 determined by the Architect/Engineer.

19 1.13 INSURANCE

20 A. This Contractor shall maintain insurance coverage as set forth in Division 1 of these  
21 specifications.

22 1.14 MATERIAL

23 A. Where several manufacturers' names are given, the first named manufacturer  
24 constitutes the basis for job design and establishes the equipment quality required to  
25 be used in this contract.

26 B. Unless otherwise noted, equivalent equipment manufactured by the other named  
27 manufacturers may be used. Contractor shall ensure that all items submitted by  
28 these other manufacturers meets all requirements of the drawings and specifications  
29 and fits in the allocated space. The Architect/Engineer shall make the final  
30 determination of whether a product is equivalent.

31 C. Any material, article, or equipment of other unnamed manufacturers which will  
32 adequately perform the services and duties imposed by the design and is of a  
33 quality equal to or better than the material, article, or equipment identified by the  
34 drawings and specifications may be used if approval is secured **in writing** from the  
35 Architect/Engineer not later than ten (10) days prior to the bid opening date. The  
36 Contractor bears full responsibility for the unnamed manufacturers equipment  
37 adequately meeting the intent of design. The Architect/Engineer may reject  
38 manufacturer at time of shop drawing submittal. The Contractor assumes all costs  
39 incurred by other trades on the project as a result of changes necessary to  
40 accommodate the offered material, equipment, or installation method.

41 D. Should this Contractor be unable to secure approval from the Architect/Engineer for  
42 other unnamed manufacturers as outlined above, this Contractor may list voluntary  
43 add or deduct prices for alternate materials on the bid form. These items will not be  
44 used in determining the low bidder. Should a voluntary alternate material be  
45 accepted, This Contractor shall assume all costs that may be incurred as a result of  
46 using the offered material, article, or equipment necessitating extra expense on This  
47 Contractor or on the part of other Contractors whose work is affected.

1 **PART 2 - PRODUCTS**

2 2.1 REFER TO INDIVIDUAL SECTIONS

3 **PART 3 - EXECUTION**

4 3.1 JOBSITE SAFETY

5 A. Neither the professional activities of the Owner or Architect/Engineer, nor the  
6 presence of the Owner or Architect/Engineer or his or her employees and  
7 subconsultants at a construction site, shall relieve the Contractor and any other  
8 entity of their obligations, duties, and responsibilities including, but not limited to,  
9 construction means, methods, sequence, techniques, or procedures necessary for  
10 performing, superintending, or coordinating all portions of the work of construction in  
11 accordance with the contract documents and any health or safety precautions  
12 required by any regulatory agencies. The Architect/Engineer and his or her  
13 personnel have no authority to exercise any control over any construction contractor  
14 or other entity or their employees in connection with their work or any health or  
15 safety precautions. The Contractor is solely responsible for jobsite safety. The  
16 Owner and Architect/Engineer and the Owner and Architect/Engineer's consultants  
17 shall be indemnified and shall be made additional insureds under the Contractor's  
18 general liability insurance policy.

19 3.2 GENERAL INSTALLATION REQUIREMENTS

20 A. Installation of all conduit and cabling shall comply with Sections 26 05 33 and  
21 26 05 13. Additional conduit requirements described within this Division shall be  
22 supplemental to the requirement described in Section 26 05 33. Should conflicts  
23 exist between the two Divisions, the more stringent (more expensive material and  
24 labor) condition shall prevail until bidding addendum or construction clarification or  
25 RFI can be submitted and responded to. In no case shall the Contractor carry the  
26 least stringent condition in the pricing.

27 B. It is the Contractor's responsibility to survey the site and include all necessary costs  
28 to perform the installation as specified.

29 C. The Contractor shall be responsible for identifying and reporting to the  
30 Architect/Engineer any existing conditions including, but not limited to, damage to  
31 walls, flooring, ceiling, and/or furnishings prior to start of work. All damage to interior  
32 spaces caused by this Contractor shall be repaired at this Contractor's expense to  
33 pre-existing conditions, including final colors and finishes.

34 D. All cables and devices installed in damp or wet locations, including any underground  
35 or underslab location, shall be listed as suitable for use in such environments.  
36 Follow manufacturer's recommended installation practices for installing cables and  
37 devices in damp or wet locations. Any cable or device that fails as a result of being  
38 installed in a damp or wet location shall be replaced at the Contractor's expense.

39 3.3 FIELD QUALITY CONTROL

40 A. General:

41 1. Refer to specific Division 28 sections for further requirements.

42 2. The Contractor shall conduct all tests required and applicable to the work  
43 both during and after construction of the work.

- 1 3. The necessary instruments and materials required to conduct or make the  
2 tests shall be supplied by the Contractor who shall also supply competent  
3 personnel for making the tests who has been schooled in the proper testing  
4 techniques.
  
- 5 4. In the event the results obtained in the tests are not satisfactory, This  
6 Contractor shall make such adjustments, replacements, and changes as are  
7 necessary and shall then repeat the test or tests which disclose faulty or  
8 defective work or equipment and shall make such additional tests as the  
9 Architect/Engineer or code enforcing agency deems necessary.
  
- 10 B. Protection of cable from foreign materials:
  - 11 1. It is the Contractor's responsibility to provide adequate physical protection to  
12 prevent foreign material application or contact with any cable type. Foreign  
13 material is defined as any material that would negatively impact the validity  
14 of the manufacturer's performance warranty. This includes, but is not  
15 limited to, overspray of paint (accidental or otherwise), drywall compound, or  
16 any other surface chemical, liquid, or compound that could come in contact  
17 with the cable, cable jacket, or cable termination components.
  
  - 18 2. Application of foreign materials of any kind on any cable, cable jacket, or  
19 cable termination component will not be accepted. It shall be the  
20 Contractor's responsibility to replace any component containing overspray,  
21 in its entirety, at no additional cost to the project. Cleaning of the cables with  
22 harsh chemicals is not allowed. This requirement is regardless of the  
23 PASS/FAIL test results of the cable containing overspray. Should the  
24 manufacturer and warrantor of the structured cabling system desire to  
25 physically inspect the installed condition and certify the validity of the  
26 structured cabling system (via a signed and dated statement by an  
27 authorized representative of the structured cabling manufacturer), the  
28 Owner may, at their sole discretion, agree to accept said warranty in lieu of  
29 having the affected cables replaced. In the case of plenum cabling, in  
30 addition to the statement from the manufacturer, the Contractor shall also  
31 present to the Owner a letter from the local Authority Having Jurisdiction  
32 stating that they consider the plenum rating of the cable to be intact and  
33 acceptable.

34 3.4 PROJECT CLOSEOUT

- 35 A. Refer to the Division 1 Section: BASIC REQUIREMENTS for requirements. The  
36 following paragraphs supplement the requirements of Division 1.
  
- 37 B. Final Jobsite Observation:
  - 38 1. The Architect/Engineer will not perform a final jobsite observation until the  
39 project is ready. This is not dictated by schedule but, rather, by  
40 completeness of the project.
  
- 41 C. Before final payment will be authorized, this Contractor must have completed the  
42 following:
  - 43 1. Submitted operation and maintenance manuals to the Architect/Engineer for  
44 review.
  
  - 45 2. Submitted bound copies of approved shop drawings.

- 1 3. As-built documents including edited drawings and specifications accurately  
2 reflecting field conditions, **inclusive** of all project revisions, change orders,  
3 and modifications.
- 4 4. Submitted a report stating the instructions given to the Owner's  
5 representative complete with the number of hours spent in the instruction.  
6 The report shall bear the signature of an authorized agent of This Contractor  
7 and shall be signed by the Owner's representative as having received the  
8 instructions.
- 9 5. Submitted testing reports for all systems requiring final testing as described  
10 herein.
- 11 6. Submitted start-up reports on all equipment requiring a factory installation  
12 inspection and/or start.

13 3.5 OPERATION AND MAINTENANCE MANUALS

14 A. General:

- 15 1. Provide an electronic copy of the O&M manuals as described below for  
16 Architect/Engineer's review and approval. The electronic copy shall be  
17 corrected as required to address the Architect/Engineer's comments. Once  
18 corrected, electronic copies and paper copies shall be distributed as  
19 directed by the Architect/Engineer.
- 20 2. Approved O&M manuals shall be completed and in the Owner's possession  
21 prior to Owner's acceptance and at least 10 days prior to instruction of  
22 operating personnel.

23 B. Electronic Submittal Procedures:

- 24 1. Distribution: Email the O&M manual as attachments to all parties designated  
25 by the Architect/Engineer.
- 26 2. Transmittals: Each submittal shall include an individual electronic letter of  
27 transmittal.
- 28 3. Format: Electronic submittals shall be in PDF format only. Clear, legible  
29 scanned copies, in PDF format, of paper originals are acceptable.  
30 Submittals that are not clear and legible will be rejected. Do not set any  
31 permission restrictions on files; protected, locked, or secured documents will  
32 be rejected.
- 33 4. File Names: Electronic submittal file names shall include the relevant  
34 specification section number followed by a description of the item submitted,  
35 as follows. Where possible, include the transmittal as the first page of the  
36 PDF instead of using multiple electronic files.
  - 37 a. O&M file name: O&M.div28.contractor.YYYYMMDD
  - 38 b. Transmittal file name: O&Mtransmittal.div28.contractor.YYYYMMDD
- 39 5. File Size: Electronic file size shall be limited to a maximum of 4MB. Larger  
40 files shall be divided into files that are clearly labeled as "1 of 2", "2 of 2",  
41 etc.

- 1 6. Provide the Owner with an approved copy of the O&M manual on compact  
2 discs (CD), digital video discs (DVD), or flash drives with a permanently  
3 affixed label, printed with the title "Operation and Maintenance Instructions",  
4 title of the project and subject matter of disc/flash drive when multiple  
5 disc/flash drives are required.
- 6 7. All text shall be searchable.
- 7 8. Bookmarks shall be used, dividing information first by specification section,  
8 then systems, major equipment, and finally individual items. All bookmark  
9 titles shall include the nomenclature used in the construction documents and  
10 shall be an active link to the first page of the section being referenced.
- 11 C. Paper Copy Submittal Procedures:
  - 12 1. Once the electronic version of the manuals has been approved by the  
13 Architect/Engineer, three (3) paper copies of the O&M manual shall be  
14 provided to the Owner. The content of the paper copies shall be identical to  
15 the corrected electronic copy.
  - 16 2. Binder Requirements: The Contractor shall submit three sets of O&M  
17 manuals in heavy duty locking three ring binders. Incorporate clear vinyl  
18 sheet sleeves on the front cover and spine for slip-in labeling. "Peel and  
19 stick" labels are **not** acceptable. Sheet lifters shall be supplied at the front  
20 of each notebook. The three-ring binders shall be a minimum of 1/2"  
21 (12mm) thicker than initial material to allow for future inserts. If more than  
22 one notebook is required, label in consecutive order. For example; 1 of 2, 2  
23 of 2. No other form of binding is acceptable.
  - 24 3. Binder Labels: Label the front and spine of each binder with "Operation and  
25 Maintenance Instructions", title of project, and subject matter.
  - 26 4. Index Tabs: Divide information by specification section, major equipment, or  
27 systems using index tabs. All tab titling shall be clearly printed under  
28 reinforced plastic tabs. All equipment shall be labeled to match the  
29 identification in the construction documents.
- 30 D. Operation and Maintenance Instructions shall include:
  - 31 1. Title Page: Include title page with project title, Architect, Engineer,  
32 Contractor, all subcontractors, and major equipment suppliers, with  
33 addresses, telephone numbers, website addresses, email addresses, and  
34 point of contacts. Website URLs and email addresses shall be active links in  
35 the electronic submittal.
  - 36 2. Table of Contents: Include a table of contents describing specification  
37 section, systems, major equipment, and individual items.
  - 38 3. Copies of all final approved shop drawings and submittals. Include  
39 Architect's/Engineer's shop drawing review comments. Insert the individual  
40 shop drawing directly after the Operation and Maintenance information for  
41 the item(s) in the review form.
  - 42 4. Copy of final approved test and balance reports.
  - 43 5. Copies of all factory inspections and/or equipment startup reports.
  - 44 6. Copies of warranties.

- 1 7. Schematic wiring diagrams of the equipment that have been updated for  
2 field conditions. Field wiring shall have label numbers to match drawings.
- 3 8. Dimensional drawings of equipment.
- 4 9. Capacities and utility consumption of equipment.
- 5 10. Detailed parts lists with lists of suppliers.
- 6 11. Operating procedures for each system.
- 7 12. Maintenance schedule and procedures. Include a chart listing maintenance  
8 requirements and frequency.
- 9 13. Repair procedures for major components.
- 10 14. List of lubricants in all equipment and recommended frequency of  
11 lubrication.
- 12 15. Instruction books, cards, and manuals furnished with the equipment.
- 13 16. Manufacturers' contact information.
- 14 17. Suppliers' contact information.

15 3.6 INSTRUCTING THE OWNER'S REPRESENTATIVE

- 16 A. Adequately instruct the Owner's designated representative or representatives in the  
17 maintenance, care, and operation of the complete systems installed under this  
18 contract.
- 19 B. Provide verbal and written instructions to the Owner's representative or  
20 representatives by FACTORY PERSONNEL in the care, maintenance, and  
21 operation of the equipment and systems.
- 22 C. The Architect/Engineer shall be notified of the time and place for the verbal  
23 instructions to be given to the Owner's representative so that their representative  
24 can be present if desirable.
- 25 D. Refer to the individual specification sections for minimum hours of instruction time  
26 for each system.
- 27 E. Operating Instructions:
  - 28 1. The Contractor is responsible for all instructions to the Owner and/or  
29 Owner's operating staff on the security systems.
  - 30 2. If the Contractor does not have Engineers and/or Technicians on staff that  
31 can adequately provide the required instructions on system operation,  
32 performance, troubleshooting, care and maintenance, they shall include in  
33 the bid an adequate amount to reimburse the Owner for the  
34 Architect/Engineer to perform these services.

1 3.7 SYSTEM COMMISSIONING

2 A. The security systems included in the construction documents are to be complete  
3 and operating systems. The Architect/Engineer will make periodic job site  
4 observations during the construction period. The system start-up, testing,  
5 configuration, and satisfactory system performance is the responsibility of the  
6 Contractor. This shall include all calibration and adjustments of electrical equipment  
7 controls, equipment settings, software configuration, troubleshooting, and  
8 verification of software and final adjustments that may be required.

9 B. All operating conditions and control sequences shall be simulated and tested during  
10 the start-up period.

11 C. The Contractor, subcontractors, and equipment suppliers are expected to have  
12 skilled technicians to insure that the system performs as designed. If the  
13 Architect/Engineer is requested to visit the job site for the purpose of trouble  
14 shooting, assisting in the satisfactory start-up, obtaining satisfactory equipment  
15 operation, resolving installation and/or workmanship problems, equipment  
16 substitution issues, or unsatisfactory system performance, including call backs  
17 during the warranty period through no fault of the design, the Contractor shall  
18 reimburse the Owner on a time and material basis for services rendered at the  
19 Architect/Engineer's standard hourly rates in effect at the time the services are  
20 requested. The Contractor shall be responsible for making payment to the Owner  
21 for services required that are product, installation, or workmanship related. Payment  
22 is due within 30 days after services are rendered.

23 3.8 AS-BUILT DOCUMENTS

24 A. Refer to the Division 1 Section: BASIC REQUIREMENTS for requirements. The  
25 following paragraphs supplement the requirements of Division 1.

26 B. Mark specifications to indicate approved substitutions, change orders, and actual  
27 equipment and materials used.

28 C. This Contractor shall maintain, at the job site, a separate and complete set of  
29 Security Drawings which shall be clearly and permanently marked and noted in  
30 complete detail any changes made to the location and arrangement of equipment or  
31 made to the Technology Systems and wiring as a result of building construction  
32 conditions or as a result of instructions from the Architect or Engineer. All Change  
33 Orders, RFI responses, Clarifications, and other supplemental instructions shall be  
34 marked on the documents. As-built documents that merely reference the existence  
35 of the above items are not acceptable. Should This Contractor fail to complete As-  
36 built Documents as required by this contract, This Contractor shall reimburse  
37 Architect/Engineer for all costs to develop As-built Documents that comply with this  
38 requirement. Reimbursement shall be made at the Architect/Engineer's hourly rates  
39 in effect at the time of work.

40 D. The above record of changes shall be made available for the Architect and  
41 Engineer's examination during any regular work time.

42 E. Upon completion of the job and before final payment is made, This Contractor shall  
43 give the marked-up drawings to the Architect/Engineer.

44 3.9 ADJUST AND CLEAN

45 A. Contractor shall thoroughly clean all equipment and systems prior to the Owner's  
46 final acceptance of the project.

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1 B. Contractor shall clean all foreign paint, grease, oil, dirt, labels, stickers, and other  
2 foreign material from equipment.

3 C. Contractor shall remove all rubbish, debris, etc., accumulated during the  
4 Contractor's operations from the premises.

5 END OF SECTION

1     **SECTION 28 05 03 - THROUGH PENETRATION FIRESTOPPING**

2     **PART 1 - GENERAL**

3     1.1     SECTION INCLUDES

4             A.     Through-Penetration Firestopping.

5     1.2     QUALITY ASSURANCE

6             A.     Manufacturer: Company specializing in manufacturing products specified in this  
7                     Section.

8             B.     Installer: Individuals performing work shall be certified by the manufacturer of the  
9                     system selected for installation.

10    1.3     REFERENCES

11            A.     UL 723 - Surface Burning Characteristics of Building Materials

12            B.     ANSI/UL 1479 - Fire Tests of Through Penetration Firestops

13            C.     UL Fire Resistance Directory Through Penetration Firestop Systems (XHEZ)

14            D.     Warnock Hersey - Directory of Listed Products

15            E.     ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building  
16                     Materials

17            F.     ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Firestops

18            G.     Wisconsin Administrative Code

19            H.     2012 International Building Code

20            I.     NFPA 5000 – Building Construction Safety Code

21    1.4     SUBMITTALS

22            A.     Submit under provisions of Section 28 05 00.

23            B.     Submit Firestopping Installers Certification for all installers on the project.

24            C.     Shop Drawings: Submit for each condition requiring firestopping. Include  
25                     descriptions of the specific penetrating item, actual wall/floor construction,  
26                     manufacturer's installation instructions, and UL or Warnock Hersey Assembly  
27                     number.

28            D.     Through-Penetration Firestop System Schedule: Indicate locations of each through-  
29                     penetration firestop system, along with the following information:

30                    1.     Types of penetrating items.

31                    2.     Types of constructions penetrated, including fire-resistance ratings and,  
32                     where applicable, thicknesses of construction penetrated.

33                    3.     Through-penetration firestop systems for each location identified by firestop  
34                     design designation of qualified testing and inspecting agency.

35                    4.     F and T ratings for each firestop system.

36            E.     Maintain a notebook on the job site at all times that contains copies of approved  
37                     submittals for all through penetration firestopping to be installed. Notebook shall be  
38                     made available to the Authority Having Jurisdiction at their request and turned over  
39                     to the Owner at the end of construction as part of the O&M Manuals.

40            F.     Submit VOC rating of firestopping material in g/L (less water) with documentation  
41                     that it meets the limits set forth in SCAQMD Rule 1168.

- 1 1.5 DELIVERY, STORAGE, AND HANDLING
- 2 A. Store, protect and handle products on site. Accept material on site in factory  
3 containers and packing. Inspect for damage. Protect from deterioration or damage  
4 due to moisture, temperature changes, contaminants, or other causes. Follow  
5 manufacturer's instructions for storage.
- 6 B. Install material prior to expiration of product shelf life.
- 7 1.6 PERFORMANCE REQUIREMENTS
- 8 A. General: For penetrations through the following fire-resistance-rated constructions,  
9 including both empty openings and openings containing penetrating items, provide  
10 through-penetration firestop systems that are produced and installed to resist spread  
11 of fire according to requirements indicated, resist passage of smoke and other  
12 gases, and maintain original fire-resistance rating of construction penetrated.
- 13 1. Fire-resistance-rated walls including fire partitions, fire barriers, and smoke  
14 barriers.
- 15 2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling  
16 assemblies, and ceiling membranes of roof/ceiling assemblies.
- 17 B. Rated Systems: Provide through-penetration firestop systems with the following  
18 ratings determined per UL 1479:
- 19 1. F-Rated Systems: Provide through-penetration firestop systems with F-  
20 ratings indicated, but not less than that equaling or exceeding fire-resistance  
21 rating of constructions penetrated.
- 22 2. T-Rated Systems: For the following conditions, provide through-penetration  
23 firestop systems with T-ratings indicated, as well as F-ratings:
- 24 a. Floor penetrations located outside wall cavities.
- 25 b. Floor penetrations located outside fire-resistance-rated shaft  
26 enclosures.
- 27 C. For through-penetration firestop systems exposed to light, traffic, moisture, or  
28 physical damage, provide products that, after curing, do not deteriorate when  
29 exposed to these conditions both during and after construction.
- 30 D. For through-penetration firestop systems exposed to view, provide products with  
31 flame-spread and smoke-developed indexes of less than 25 and 450, respectively,  
32 as determined per ASTM E 84.
- 33 E. For through-penetration firestop systems in air plenums, provide products with  
34 flame-spread and smoke-developed indexes of less than 25 and 50, respectively, as  
35 determined per ASTM E 84.
- 36 1.7 MEETINGS
- 37 A. Pre-installation meeting: A pre-installation meeting shall be scheduled and shall  
38 include the Construction Manager, General Contractor, all Subcontractors  
39 associated with the installation of systems penetrating fire barriers, Firestopping  
40 Manufacturer's Representative, and the Owner.
- 41 1. Review foreseeable methods related to firestopping work.
- 42 2. Tour representative areas where firestopping is to be installed; inspect and  
43 discuss each type of condition and each type of substrate that will be  
44 encountered, and preparation to be performed by other trades.

- 1     1.8     WARRANTY
- 2             A.     Provide one year warranty on parts and labor.
- 3             B.     Warranty shall cover repair or replacement of firestop systems which fail in joint  
4                     adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance,  
5                     migration resistance, stain resistance, general durability, or appear to deteriorate in  
6                     any manner not clearly specified by the manufacturer as an inherent quality of the  
7                     material.

8     **PART 2 - PRODUCTS**

9     2.1     MANUFACTURERS

- 10            A.     Products: Subject to compliance with requirements, provide one of the through-  
11                    penetration firestop systems indicated for each application that are produced by one  
12                    of the following manufacturers. All firestopping systems installed shall be provided  
13                    by a single manufacturer.

- 14                    1.     3M; Fire Protection Produces Division.  
15                    2.     Hilti, Inc.  
16                    3.     RectorSeal Corporation, Metacaulk.  
17                    4.     Tremco; Sealant/Weatherproofing Division.  
18                    5.     Johns-Manville.  
19                    6.     Specified Technologies Inc. (S.T.I.)  
20                    7.     Spec Seal Firestop Products  
21                    8.     AD Firebarrier Protection Systems  
22                    9.     Wiremold/Legrand: FlameStopper

23     2.2     THROUGH PENETRATION FIRESTOP SYSTEMS

- 24            A.     Provide materials and systems classified by or listed by Warnock Hersey to provide  
25                    firestopping equal to time rating of construction being penetrated.
- 26            B.     All firestopping materials shall be free of asbestos, lead, PCB's, and other materials  
27                    that would require hazardous waste removal.
- 28            C.     Firestopping shall be flexible to allow for normal penetrating item movement due to  
29                    expansion and contraction.
- 30            D.     Firestopping systems for plumbing and wet pipe sprinkler piping shall be moisture  
31                    resistant.
- 32            E.     Provide firestopping systems capable of supporting floor loads where systems are  
33                    exposed to possible floor loading or traffic.
- 34            F.     Provide firestopping systems allowing continuous insulation for all insulated pipes.
- 35            G.     Provide firestopping systems classified by UL or listed by Warnock Hersey for  
36                    penetrations through all fire rated construction. Firestopping systems shall be  
37                    selected from the UL or listed by Warnock Hersey Fire Resistance Directory  
38                    Category XHEZ based on substrate construction and penetrating item size and  
39                    material and shall fall within the range of numbers listed:

- 1 1. Combustible Framed Floors and Chase Walls - 1 or 2 Hour Rated  
 2 F Rating = Floor/Wall Rating  
 3 T Rating = Floor/Wall Rating

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	FC 0000-0999*
Metallic Pipe or Conduit	FC 1000-1999
Non-Metallic Pipe or Conduit	FC 2000-2999
Electrical Cables	FC 3000-3999
Cable Trays	FC 4000-4999
Insulated Pipes	FC 5000-5999
Bus Duct and Misc. Electrical	FC 6000-6999
Duct without Damper and Misc. Mechanical	FC 7000-7999
Multiple Penetrations	FC 8000-8999

- 4 2. Non-Combustible Framed Walls - 1 or 2 Hour Rated  
 5 F Rating = Wall Rating  
 6 T Rating = 0

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	WL 0000-0999*
Metallic Pipe or Conduit	WL 1000-1999
Non-Metallic Pipe or Conduit	WL 2000-2999
Electrical Cables	WL 3000-3999
Cable Trays	WL 4000-4999
Insulated Pipes	WL 5000-5999
Bus Duct and Misc. Electrical	WL 6000-6999
Duct without Damper and Misc. Mechanical	WL 7000-7999
Multiple Penetrations	WL 8000-8999

- 7 3. Concrete or Masonry Floors and Walls - 1 or 2 Hour Rated  
 8 F Rating = Wall/Floor Rating  
 9 T Rating (Floors) = Floor Rating

<u>Penetrating Item</u>	<u>UL System No.</u>
No Penetrating Item	CAJ 0000-0999*
Metallic Pipe or Conduit	CAJ 1000-1999
Non-Metallic Pipe or Conduit	CAJ 2000-2999
Electrical Cables	CAJ 3000-3999
Cable Trays	CAJ 4000-4999
Insulated Pipes	CAJ 5000-5999
Bus Duct and Misc. Electrical	CAJ 6000-6999
Duct without Damper and Misc. Mechanical	CAJ 7000-7999
Multiple Penetrations	CAJ 8000-8999

10 \*Alternate method of firestopping is patching opening to match original rated  
 11 construction.

- 12 H. Any opening in walls or floors not covered by the listed series of numbers shall be  
 13 coordinated with the firestopping manufacturer.

- 1 I. Any openings in floors or walls not described in the UL or listed by Warnock Hersey  
2 Fire Resistance Directory, or outlined in manufacturer's information shall be sealed  
3 in a manner agreed upon by the Firestopping Manufacturer, Owner, and the  
4 Authority Having Jurisdiction.

### 5 **PART 3 - EXECUTION**

#### 6 3.1 EXAMINATION

- 7 A. Ensure all surfaces that contact seal materials are free of dirt, dust, grease, oil, rust,  
8 or loose materials. Clean and repair surfaces as required. Remove laitance and  
9 form-release agents from concrete.
- 10 B. Ensure substrate and penetrating items have been permanently installed prior to  
11 installing firestopping systems. Ensure penetrating items have been properly  
12 spaced and have proper clearance prior to installing firestopping systems.
- 13 C. Surfaces to which sealing materials are to be installed must meet the selected UL or  
14 Warnock Hersey system substrate criteria.
- 15 D. Prime substrates where recommended in writing by through-penetration firestop  
16 system manufacturer. Confine primer to area of bond.

#### 17 3.2 INSTALLATION

- 18 A. In existing construction, provide firestopping of openings prior to and after  
19 installation of penetrating items. Remove any existing coatings on surfaces prior to  
20 firestopping installation. Temporary firestopping shall consist of packing openings  
21 with fire resistant mineral wool for the full thickness of substrate, or an alternate  
22 method approved by the Authority Having Jurisdiction. All openings shall be  
23 temporarily firestopped immediately upon their installation and shall remain so until  
24 the permanent UL or listed by Warnock Hersey listed firestopping system is  
25 installed.
- 26 B. Install penetration seal materials in accordance with printed instructions of the UL or  
27 Warnock Hersey Fire Resistance Directory and with the manufacturer's printed  
28 application instructions.
- 29 C. Install dams as required to properly contain firestopping materials within openings  
30 and as required to achieve required fire resistance rating. Remove combustible  
31 damming after appropriate curing.

#### 32 3.3 CLEANING AND PROTECTING

- 33 A. Clean excess fill materials adjacent to openings as Work progresses by methods  
34 and with cleaning materials that are approved in writing by through-penetration  
35 firestop system manufacturers and that do not cause damage.
- 36 B. Provide final protection and maintain conditions during and after installation that  
37 ensure that through-penetration firestop systems are without damage or  
38 deterioration at time of Substantial Completion. If, despite such protection, damage  
39 or deterioration occurs, remove damaged or deteriorated through-penetration  
40 firestop systems immediately and install new materials to produce systems  
41 complying with specified requirements.

- 1    3.4    INSPECTION
- 2            A.    Access to firestop systems shall be maintained for examination by the Authority  
3                    Having Jurisdiction at their request.
- 4            B.    Proceed with enclosing through-penetration firestop system with other construction  
5                    only after inspection reports are issued and firestop installations comply with  
6                    requirements.
- 7            C.    The contractor shall allow for visual destructive review of 5% of installed firestop  
8                    systems (minimum of one) to prove compliance with specifications and  
9                    manufacturer's instructions and details. Destructive system removal shall be  
10                   performed by the contractor and witnessed by the engineer and manufacturer's  
11                   factory representative. The engineer shall have sole discretion of which firestop  
12                   system installations will be reviewed. The contractor is responsible for all costs  
13                   associated with this requirement including labor and material for removing and  
14                   replacing the installed firestop system. If any firestop system is found to not be  
15                   installed per manufacturer's specific instructions and details, all firestop systems are  
16                   subject to destructive review and replacement at the engineer's discretion and the  
17                   contractor's expense.
- 18    END OF SECTION

1 **SECTION 28 05 26 - ELECTRONIC SAFETY AND SECURITY SYSTEM**  
2 **BONDING**

3 **PART 1 - GENERAL**

4 1.1 SECTION INCLUDES

- 5 A. Bonding Conductors  
6 B. Bonding Connectors

7 1.2 RELATED WORK

- 8 A. Section 26 05 33 – Conduit  
9 B. Section 26 05 13 – Wire and Cable  
10 C. Section 26 05 26 – Grounding and Bonding  
11 D. Section 28 05 00 – Basic Electronic Safety and Security Systems Requirements  
12 E. Section 28 05 03 – Through Penetration Firestopping

13 1.3 QUALITY ASSURANCE

- 14 A. Refer to Section 28 05 00 for relevant standards.  
15 B. Communications bonding system component, device, equipment, and material  
16 manufacturer(s) shall have a minimum of five (5) years documented experience in  
17 the manufacture of communications bonding products.  
18 C. The entire installation shall comply with all applicable electrical codes, safety codes,  
19 and standards. All applicable components, devices, equipment, and material shall  
20 be listed by Underwriters' Laboratories, Inc.

21 1.4 REFERENCES

- 22 A. ANSI/IEEE 1100 – Recommended Practice for Power and Grounding Sensitive  
23 Electronic Equipment in Industrial and Commercial Power Systems  
24 B. ANSI-J-STD-607-A – Commercial Building Grounding (Earthing) and Bonding  
25 Requirements for Telecommunications  
26 C. IEEE 81 – IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and  
27 Earth Surface Potentials of a Ground System Part 1: Normal Measurements  
28 D. IEEE 837 – IEEE Standard for Qualifying Permanent Connections Used in  
29 Substation Grounding  
30 E. NFPA 70 – National Electrical Code  
31 F. UL 467 – Grounding and Bonding Equipment

32 1.5 SUBMITTALS

- 33 A. Submit product data and shop drawings under provisions of Section 28 05 00 and  
34 Division 1.

- 1 B. Provide manufacturer's technical product specification sheet for each individual  
2 component type. Submitted data shall show the following:
- 3 1. Compliance with each requirement of these documents. The submittal shall  
4 acknowledge each requirement of this section, item-by-item, including  
5 construction, materials, ratings, and all other parameters identified in Part 2  
6 - Products.
- 7 2. Manufacturer's installation instructions indicating application conditions and  
8 limitations of use stipulated by product testing agency. Include instructions  
9 for storage, handling, protection, examination, preparation, installation, and  
10 starting of product.
- 11 C. Provide CAD-generated, project-specific system shop drawings as follows:
- 12 1. Provide a system block diagram indicating system configuration, system  
13 components, interconnection between components, and conductor routing.  
14 The diagram shall clearly indicate all wiring and connections required in the  
15 system. When multiple devices or pieces of equipment are required in the  
16 exact same configuration (e.g., multiple identical equipment racks or  
17 sections of ladder tray), the diagram may show one device and refer to the  
18 others as "typical" of the device shown. The diagram shall list room numbers  
19 where system equipment will be located.
- 20 2. Installation details for all system components.
- 21 D. Provide system checkout test procedure to be performed at acceptance.
- 22 1.6 DELIVERY, STORAGE, AND HANDLING
- 23 A. Deliver products to the site under the provisions of Section 28 05 00.
- 24 B. Store and protect products under the provisions of Section 28 05 00.
- 25 C. Contractor shall exercise care to prevent corrosion of any products prior to  
26 installation. Corroded products shall not be acceptable for use on this project.
- 27 1.7 SYSTEM DESCRIPTION
- 28 A. This section describes the requirements for the furnishing, installation, adjusting,  
29 and testing of additional components and conductors added to an existing bonding  
30 system, including connection to the electrical ground grid.
- 31 B. Performance Statement: This specification section and the accompanying drawings  
32 are performance based, describing the minimum material quality, required features,  
33 operational requirements, and performance of the system. These documents do not  
34 convey every wire that must be installed, every equipment connection that must be  
35 made, or every feature and function that must be configured. Based on the  
36 equipment constraints described and the performance required of the system as  
37 presented in these documents, the Contractor is solely responsible for determining  
38 all components, devices, equipment, wiring, connections, and terminations required  
39 for a complete and operational system that provides the required performance.
- 40 C. This document describes the major components of the system. All additional  
41 hardware, subassemblies, supporting equipment, and other miscellaneous  
42 equipment required for complete, proper system installation and operation shall be  
43 provided by the Contractor.

- 1 D. Basic System Requirements:
- 2 1. A complete communications bonding infrastructure is required for this  
3 project. Refer to the drawings and the requirements of ANSI-J-STD-607-A  
4 and NFPA 70 for complete information.
- 5 2. The bonding system shall include, but not be limited to, the following major  
6 components:
- 7 a. Bonding Conductor for Telecommunications (BCT)  
8 b. Telecommunications Main Grounding Busbar (TMGB)  
9 c. Telecommunications Bonding Backbone (TBB)  
10 d. Telecommunications Grounding Busbar(s) (TGB)  
11 e. Rack mount Telecommunications Grounding Busbar(s)  
12 f. Bonding Conductor(s) (BC)  
13 g. Bonding Connectors
- 14 3. This project will add new bonding devices and conductors to an existing  
15 bonding system as necessary to provide bonding and grounding for new  
16 systems devices and equipment installed as part of this project.

17 1.8 PROJECT RECORD DOCUMENTS

- 18 A. Submit documents under the provisions of Section 28 05 00.
- 19 B. Provide final system block diagram showing any deviations from approved shop  
20 drawing submittal.
- 21 C. Provide floor plans that document the following:
- 22 1. Actual locations of system components, devices, and equipment.  
23 2. Actual conductor routing.  
24 3. Actual system component, device, equipment, and conductor labels.
- 25 D. Provide statement that system checkout test, as outlined in the approved shop  
26 drawing submittal, is complete and test results were satisfactory.
- 27 E. Complete all operation and maintenance manuals as described below.

28 1.9 OPERATION AND MAINTENANCE DATA

- 29 A. Submit under provisions of Section 28 05 00.
- 30 B. Submitted data shall include:
- 31 1. Approved shop drawings.
- 32 2. Descriptions of recommended system maintenance procedures, including:
- 33 a. Inspection  
34 b. Periodic preventive maintenance  
35 c. Fault diagnosis  
36 d. Repair or replacement of defective components

1 **PART 2 - PRODUCTS**

2 2.1 BONDING CONDUCTORS

3 A. Bare Copper:

- 4 1. Annealed uncoated stranded conductor.  
5 2. Minimum size 6 AWG.

6 B. Insulated Copper:

- 7 1. Annealed uncoated stranded conductor.  
8 2. Insulation:  
9 a. PVC insulation with nylon outer jacket.  
10 b. Rated  $\geq$  600 volts.  
11 c. Green.  
12 3. Minimum size 6 AWG.

13 C. All bonding conductors shall be listed and recognized by a nationally recognized  
14 testing laboratory as being suitable for the intended purpose and for installation in  
15 the space in which they are installed.

16 D. Bonding Conductor Sizing

- 17 1. All Communications bonding system conductors shall be sized by length as  
18 follows:

Length Linear ft (m)	Size (AWG)
Less than 13 (4)	6
14 - 20 (4 - 6)	4
21 - 26 (6 - 8)	3
27 - 33 (8 - 10)	2
34 - 41 (10 - 13)	1
42 - 52 (13 - 16)	1/0
53 - 66 (16 - 20)	2/0
Greater than 66 (20)	3/0

- 19 2. The BCT shall be the same size as the TBB or larger.

20 2.2 BONDING CONNECTORS

21 A. Acceptable Types:

- 22 1. Two-hole compression lug  
23 2. Exothermic weld  
24 3. Irreversible compression

25 B. Connectors shall be provided in kit form and selected per manufacturer's written  
26 instructions.

27 C. Connectors shall comply with IEEE 837 and UL 467 and be listed for use for specific  
28 types, sizes, and combinations of conductors and connected items.

1     **PART 3 - EXECUTION**

2     3.1    **INSTALLATION**

3           A.     General Bonding Requirements:

4                 1.     The communications bonding system shall be a complete system.  
5                         Contractor shall furnish and install all necessary miscellaneous components,  
6                         devices, equipment, material, and hardware, including, but not limited to,  
7                         lock washers, paint-piercing washers, hex nuts, compression lugs,  
8                         insulators, mounting screws, lugs, etc., to provide a complete system.

9                 2.     A licensed electrician shall perform all bonding.

10                3.     Comply with the manufacturer's instructions and recommendations for  
11                         installation of all products.

12           B.     Metallic Interior Communication Pathway Bonding Requirements:

13                 1.     All metallic interior continuous communication cable pathways, including,  
14                         but not limited to, conduit, conduit sleeves, fire-rated cable pathway devices,  
15                         cable tray, basket tray, and ladder rack, shall be bonded to the  
16                         communications bonding system.

17           C.     Bonding Conductor Requirements:

18                 1.     Bonding conductors shall be green or marked with a distinctive green color.

19                 2.     Bonding conductors shall be routed parallel and perpendicular to building  
20                         structure along shortest and straightest paths possible. Number of bends  
21                         and changes in direction should be minimized. Install and secure  
22                         conductors in a manner that protects the conductors from impact and from  
23                         physical or mechanical strain or damage.

24                 3.     Bonding conductors shall not be installed in metallic conduit.

25                 4.     All conductors, including, but not limited, to the BCT, TBB, GE(s), and  
26                         BC(s), shall be installed splice-free. If the Contractor believes that site  
27                         conditions do not allow a splice-free installation, the Contractor may request  
28                         permission from the Architect/Engineer to splice a specific communications  
29                         bonding system conductor.

30                         a.     Where documented permission to splice a conductor is granted:

31                                 1)     The number of splices shall be limited to as few as possible.

32                                 2)     Splices shall be made using exothermic welding or  
33                                 irreversible compression-type connections only. Splice  
34                                 hardware shall be listed for grounding and bonding. Solder  
35                                 is not an acceptable means of splicing conductors.

36                                 3)     Splices shall be made in telecommunications spaces in  
37                                 accessible locations to facilitate future inspection and  
38                                 maintenance.

39                                 4)     Splices shall be adequately supported and protected from  
40                                 impact and from physical or mechanical strain or damage.

- 1 5. Interior water piping is not acceptable for use as a communications bonding  
2 system bonding conductor.
- 3 6. Metallic cable shields are not acceptable for use as communications  
4 bonding system bonding conductors.
- 5 D. Bonding Connection Requirements:
- 6 1. Make all connections in accessible locations to facilitate future inspection  
7 and maintenance.
- 8 2. Communications bonding system connections shall be made using  
9 exothermic welding, two-hole compression lugs, or other irreversible  
10 compression-type connections. The use of 1-hole lugs is prohibited, except  
11 for connections to a rack-mount telecommunications ground bar.  
12 Connection hardware shall be listed for grounding and bonding. Sheet  
13 metal screws shall not be used to make communications bonding system  
14 connections.
- 15 3. Thoroughly clean conductors before installing lugs and connectors.
- 16 4. Install and tighten all connectors in accordance with manufacturer's  
17 instructions, using the appropriate purpose-designed tool(s) recommended  
18 by the manufacturer for that purpose. Exercise care not to tighten  
19 connectors beyond manufacturer's recommendations.
- 20 5. Where necessary, remove paint and/or use paint-piercing washers to  
21 provide proper electrical bond at all connections.
- 22 6. All bonding connections shall be coated in anti-oxidant joint compound that  
23 is purpose-designed and purpose-manufactured for that use. Anti-oxidant  
24 joint compound shall be applied in accordance with manufacturer's  
25 recommendations and instructions.
- 26 7. All installed connectors on conductors installed in damp locations shall be  
27 sealed with dielectric grease and then covered with heat shrink tubing to  
28 protect against moisture ingress. Applied heat shrink tubing shall overlap  
29 conductor's outer jacket a minimum of four (4) inches past connector and be  
30 installed in accordance with manufacturer's recommendations and  
31 instructions.

### 32 3.2 FIELD QUALITY CONTROL

- 33 A. Field inspection and testing shall be performed under provisions of Section  
34 28 05 00.
- 35 B. Where these specifications require a product or assembly without the use of a brand  
36 or trade name, provide a product from a reputable manufacturer that meets the  
37 requirements of the specifications.
- 38 C. Periodic observations will be performed during construction to verify compliance with  
39 the requirements of the specifications. These services do not relieve the Contractor  
40 of responsibility for compliance with the contract documents.

1 3.3 ADJUSTING

2 A. Adjust work under provisions of Section 28 05 00.

3 B. Contractor shall make any and all adjustments to the communications bonding  
4 system necessary to ensure that the installed system meets all requirements listed  
5 herein. Modifications necessary to comply with listed requirements or to provide  
6 specified performance shall be completed by the Contractor at no additional cost to  
7 the Owner.

8 END OF SECTION

1     **SECTION 28 13 00 - ELECTRONIC ACCESS CONTROL**

2     **PART 1 - GENERAL**

3     1.1     SECTION INCLUDES

- 4           A.     Server Hardware/Software.
- 5           B.     Client Workstations.
- 6           C.     Intelligent System Controllers.
- 7           D.     Operator Interface Software.
- 8           E.     Application Software.
- 9           F.     Graphical User Interface (GUI).
- 10          G.     Readers and Credentials.
- 11          H.     Interfaces and Integrations

12    1.2     RELATED WORK

- 13          A.     Section 28 05 00 - Basic Electronic Safety and Security System Requirements.
- 14          B.     Section 26 05 33 - Conduit & Boxes
- 15          C.     Section 26 05 13 - Wire and Cable.
- 16          D.     Section 28 31 00 - Fire Alarm and Detection Systems.

17    1.3     QUALITY ASSURANCE

- 18          A.     Manufacturer: The manufacturer shall have a minimum of five (5) years documented  
19                 experience.
- 20          B.     Installer: The installing dealer must be a factory-authorized service and support  
21                 company specializing in the selected manufacturer's product, with prior experience  
22                 with the selected manufacturer's system installation and programming.

23    1.4     REFERENCES

- 24          A.     NFPA 70 - National Electrical Code.
- 25          B.     UL 294 - Standard for Access Control Systems.

26    1.5     SUBMITTALS

- 27          A.     Submit shop drawings and product data under provisions of Section 28 05 00.
- 28          B.     Product Data Submittal: Provide manufacturer's technical product specification  
29                 sheet for each individual component type. Submitted data shall show the following:
  - 30                 1.     Compliance with each requirement of these documents. The submittal shall  
31                         acknowledge each requirement of this section, item-by-item.
  - 32                 2.     All component options and accessories specific to this project.
  - 33                 3.     Electrical power consumption rating and voltage including UPS sizing.
  - 34                 4.     Heat generation for all power consuming devices.
  - 35                 5.     Wiring requirements.

- 1 C. System Drawings: Project-specific system CAD drawings shall be provided as  
2 follows:
- 3 1. Provide a system block diagram noting system components and  
4 interconnection between components. The interconnection of components  
5 shall clearly indicate all wiring required in the system. When multiple pieces  
6 of equipment are required in the exact same configuration (e.g., multiple  
7 identical controllers), the diagram may show one device and refer to the  
8 others as "typical" of the device shown. The diagram should list room  
9 numbers where each controller will be located.
- 10 2. Provide a schedule of all controllers and the doors/points each controller  
11 controls.
- 12 3. Provide schedules describing each system input location by an  
13 architecturally familiar reference (e.g., Door 312A). The architectural door  
14 schedule shall be used as the basis.
- 15 D. Submit sample format of site specific programming guides to be used for system  
16 planning/programming conference with Owner.
- 17 E. Submit meeting agenda for planning/programming conference required in Part 3 of  
18 this specification.
- 19 F. Submit detailed description of Owner training to be conducted at project end,  
20 including specific training times.
- 21 G. Quality Assurance:
- 22 1. Provide system checkout test procedure to be performed at acceptance.  
23 Test procedures shall include all external alarm events.

24 1.6 SYSTEM DESCRIPTION

- 25 A. This specification section describes the furnishing, installation, commissioning and  
26 programming of additional equipment added to an existing security management  
27 system.
- 28 B. Performance Statement: This specification section and the accompanying access  
29 control-specific design documents are performance based, describing the minimum  
30 material quality, required features, and operational requirements of the system.  
31 These documents do not convey every wire that must be installed and every  
32 equipment connection that must be made. Based on the equipment constraints  
33 described and the performance required of the system as presented in these  
34 documents, the vendor and the Contractor are solely responsible for determining all  
35 wiring, programming, and miscellaneous equipment required. The Contractor shall  
36 be responsible for determining quantities of materials required for a complete and  
37 operational system. Floor plan drawings and schedules have been developed to aid  
38 the Contractor in determining device quantities and installation locations but, where  
39 discrepancies between floor plans and schedules arise, the greater number shall  
40 govern.
- 41 C. Basic System Description: The security management system (SMS) shall provide  
42 an integrated hardware and software solution for access control and additional  
43 modules as described herein.

## 1 1.7 LICENSING REQUIREMENTS

2 A. All user licenses required for system operation shall be included in the Contractor's  
3 bid. User licenses shall include, but not be limited to, server and workstation  
4 software, network controllers, card readers, printers, badging stations, and any other  
5 licensing that is required by the manufacturer for operation of any system  
6 component.

7 1. Licenses shall be provided on a one-to-one basis. One license shall be  
8 provided for each device requiring a license. In the event the manufacturer  
9 requires the purchase of a block of licenses, the minimum standard  
10 licensing package to support all devices shall be provided.

11 2. The system described herein is an extension of an existing Vykon system.  
12 All licensing shall be new for each installed device. The Contractor shall not  
13 use any of the Owner's existing (spare) licenses for any new components.

## 14 1.8 PROJECT RECORD DOCUMENTS

15 A. Submit documents under the provisions of Section 28 05 00.

16 B. Provide final system block diagram showing any deviations from shop drawing  
17 submittal.

18 C. Provide statement that system checkout test, as outlined in the shop drawing  
19 submittal, is complete and satisfactory.

20 D. Provide schedules documenting:

21 1. Controller installation locations including specific door numbers being  
22 controlled.

23 2. All terminal block wiring, including cable numbers.

24 E. Warranty: Submit written warranty and complete all Owner registration forms.

25 F. Complete all operation and maintenance manuals as described below.

## 26 1.9 OPERATION AND MAINTENANCE DATA

27 A. Submit documents under the provisions of Section 28 05 00.

28 B. Manuals: Final copies of the manuals shall be delivered within 14 days after  
29 completing the installation test. Each manual's contents shall be identified on the  
30 cover. The manual shall include names, addresses, and telephone numbers of the  
31 contractor responsible for the installation and maintenance of the system and the  
32 factory representatives for each item of equipment for each system. The manuals  
33 shall have a table of contents and labeled sections. The final copies delivered after  
34 completion of the installation test shall include all modifications made during  
35 installation, checkout, and acceptance testing. Manuals shall be submitted in both  
36 hardcopy and electronic format. The manuals shall consist of the following:

37 1. Functional Design Manual: The functional design manual shall identify the  
38 operational requirements for the system and explain the theory of operation,  
39 design philosophy, and specific functions. A description of hardware and  
40 software functions, interfaces, and requirements shall be included.

- 1                   2.     Hardware Manual: The manual shall describe all equipment furnished  
2                   including:
- 3                   a.     General description and specifications.  
4                   b.     Installation and check out procedures.  
5                   c.     Equipment layout and electrical schematics to the component level.  
6                   d.     System layout drawings and schematics.  
7                   e.     Alignment and calibration procedures.  
8                   f.     Manufacturers repair parts list indicating sources of supply.
- 9                   3.     Software Manual: The software manual shall describe the functions of all  
10                  software and shall include all other information necessary to enable proper  
11                  loading, testing, and operation. The manual shall include:
- 12                  a.     Definition of terms and functions.  
13                  b.     System use and application software.  
14                  c.     Initializations, startup, and shutdown.  
15                  d.     Reports generation.  
16                  e.     Details on forms customization and field parameters.
- 17                  4.     Operator's Manual: The operators manual shall fully explain all procedures  
18                  and instructions for the operation of the system including:
- 19                  a.     Computers and peripherals.  
20                  b.     System startup and shut down procedures.  
21                  c.     Use of system, command, and applications software.  
22                  d.     Recovery and restart procedures.  
23                  e.     Graphic alarm presentation.  
24                  f.     Use of report generator and generation of reports.  
25                  g.     Data entry.  
26                  h.     Operator commands.  
27                  i.     Alarm messages and reprinting formats.  
28                  j.     System permissions functions and requirements.
- 29                  5.     Maintenance Manual: The maintenance manual shall include descriptions of  
30                  maintenance for all equipment including inspection, periodic preventive  
31                  maintenance, fault diagnosis, and repair or replacement of defective  
32                  components.

### 33     1.10    WARRANTY

- 34                  A.     Unless otherwise noted, provide warranty for one (1) year after Date of Substantial  
35                  Completion for all materials and labor.

## 36     **PART 2 - PRODUCTS**

### 37     2.1     ELECTRONIC ACCESS CONTROL SYSTEM MANUFACTURERS

- 38                  A.     Vykon

### 39     2.2     SERVER HARDWARE/SOFTWARE

- 40                  A.     Existing to remain.



- 1  
2
6. The controller, or each controller card (if more than one card is provided in a controller cabinet) shall support at a minimum:
- 3 a. Two readers.  
4 b. Four door status switches (supervised).  
5 c. Two request-to-exit devices (supervised).  
6 d. Outputs to operate two sets of electrified door hardware.
- 7
7. Input Control Module (ICM):
- 8 a. The Input Control Module shall provide UL 1076 Grade B, A or AA  
9 alarm input zones and monitor/report line fault conditions, alarm  
10 conditions, power faults and tampers. Status LEDs shall provide  
11 information about the alarm zone inputs, cabinet tamper, and power  
12 fault.
- 13 1) In addition, the ICM shall incorporate the following features:
- 14 a) UL 294 listed.  
15 b) Automatic alarm contact status scanning at not less  
16 than 1/10th of a second per zone.  
17 c) Electronic assignment of unit addresses and  
18 communications speed.  
19 d) Elevator control support for number of floors shown  
20 on the drawings.  
21 e) Line supervision.  
22 f) Noise rejection filtering to prevent false alarms.
- 23 b. The SMS shall provide the following options for the Input Control  
24 Modules:
- 25 1) Alarm Masking: The ability to mask the alarm input on a  
26 time zone basis.  
27 2) Local Linkage: The ability to locally link outputs with inputs  
28 that are attached to the same ICM/Output Control Module  
29 (OCM).  
30 3) Activate Output: The ability to activate an output tied to the  
31 ICM/OCM on a time zone basis.  
32 4) Activate Output Always: The ability to activate an output  
33 always.  
34 5) Configuration of Debounce Times: The ability to control the  
35 amount of time that an input state change must remain  
36 consistent in order for it to be considered a real change of  
37 state.  
38 6) Configuration of Hold Times: When configuring an Alarm  
39 Input, a hold-time setting shall be settable from 0-15  
40 seconds.

- 1 7) Checkpoint: The ability to configure an input as a  
2 designated stop on one or more guard tours.
- 3 8) Supervised Input: The ability to specify if a specific alarm  
4 contact on the ICM is a supervised or unsupervised contact.
- 5 9) Entry/Exit Delay: The ability to set up entry/exit delays for  
6 inputs that are attached to any ICM. This shall include:
- 7 a) Non-Latched Entry: When an input activates, the  
8 alarm will not be reported until the Entry delay  
9 expires. If the input is still active when the entry  
10 delay expires, the alarm will be reported. If the input  
11 is not active when the entry delay expires, then the  
12 alarm will not report.
- 13 b) Latched Entry: When an input activates, the alarm  
14 will not be reported until the Entry delay expires. If  
15 the input is still active when the entry delay expires  
16 AND the alarm has NOT BEEN MASKED, the  
17 alarm will be reported. If the input has been masked  
18 when the entry delay expires, then the alarm will not  
19 report.
- 20 c) Exit Delay: When an input activates, the alarm will  
21 not be reported (operates as if masked) until the  
22 Exit delay expires. If the input is still active when the  
23 exit delay expires, the alarm will be reported. If the  
24 input is not active when the exit delay expires, the  
25 alarm will not be reported.
- 26 8. Output Control Module (OCM):
- 27 a. The Output Control Module(s) shall provide Form-C relay contacts  
28 for load switching. The relays shall be configurable for fail-safe or  
29 fail-secure operation. Each relay shall support "On" "Off" and  
30 "Pulse."
- 31 1) Onboard termination jumpers.
- 32 2) Selectable addressing.
- 33 3) Status LEDs for communication to the host, heartbeat and  
34 relay status.
- 35 4) Elevator control, support for number of floors shown on the  
36 drawings.
- 37 J. All controller cabinets shall be provided with a key lockable door, all keyed alike.  
38 The cabinet door shall be supervised with a tamper switch input, alarming at the  
39 workstation.
- 40 K. Power supplies internal to the cabinet shall provide all necessary power for the  
41 readers and all input/output modules.

- 1 L. Controllers are NOT shown on the plans. Refer to the installation section of this  
2 specification for allowable controller mounting locations. The required number and  
3 configuration of controllers required is the responsibility of the Contractor and SMS  
4 Vendor, based on the inherent characteristics of each product line and the  
5 restrictions described in this document.
- 6 2.5 OPERATOR INTERFACE SOFTWARE
- 7 A. Existing to remain.
- 8 2.6 APPLICATION SOFTWARE
- 9 A. Existing to remain.
- 10 2.7 READERS
- 11 A. Proximity Readers: Operable at 125 kHz, FCC Certified, 26-bit H10301 format.
- 12 1. Provide with a multi-colored LED and audible device, which shall change  
13 state on presentation of a valid proximity card.
- 14 2. All readers shall perform an internal self-diagnostic procedure at power-up.
- 15 3. Provide tamper switch for notification to the system of reader tampering.
- 16 4. Readers shall employ compensation circuitry or other process that allows it  
17 to be mounted directly to metal surfaces. The reader shall be immune to  
18 metallic distortion from keys, coins and other metallic objects.
- 19 5. Operating Range: -22°F to 150°F.
- 20 6. Provide all necessary backboxes and mounting brackets required for  
21 installation of the reader where shown on the plans.
- 22 7. Range: Read range of 5" to 9" standard.
- 23 8. Readers shall be constructed in a weatherproof Lexan or polycarbonate  
24 housing suitable for indoor or outdoor use.
- 25 9. Readers shall be provided with a lifetime warranty.
- 26 2.8 CREDENTIALS
- 27 A. By Owner.
- 28 2.9 ELECTRONIC ACCESS CONTROL SYSTEM CABLE
- 29 A. All Electronic Access Control System cable shall meet or exceed published  
30 minimum requirements identified by equipment, device, material, and hardware  
31 manufacturers. Where manufacturer's published minimum hardware requirements  
32 differ from those listed in the project documents, the more stringent performance  
33 requirement shall govern.
- 34 B. Cabling shall be plenum rated when installed outside of conduit in plenum ceilings.

- 1 C. Credential Reader Cable
- 2 1. 18 AWG, 9 conductor shielded with drain wire
- 3 a. Conductor Type: Bare copper, stranded
- 4 b. Voltage Capacity:  $\geq 300$  volts RMS
- 5 c. Current Capacity:  $\geq 3.5$  amps per conductor
- 6 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 7 e. Nom. Capacitance, Conductor to Other Conductor and Shield:  $\leq 30$
- 8 pF/ft
- 9 f. Jacket: CMP
- 10 2. Basis of Design: Belden 6307FE
- 11 D. Electrified Locking Hardware Cable
- 12 1. 14 AWG, 2 conductor
- 13 a. Conductor Type: Bare copper, stranded
- 14 b. Voltage Capacity:  $\geq 150$  volts RMS
- 15 c. Current Capacity:  $\geq 8$  amps per conductor
- 16 d. Nominal Conductor DC Resistance:  $\leq 0.0027$  Ohms/ft
- 17 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 36$  pF/ft
- 18 f. Jacket: CMP
- 19 2. Basis of Design: Belden 6100UE
- 20 E. Magnetic Bond Sensor Cable
- 21 1. 18 AWG, 2 conductor
- 22 a. Conductor Type: Bare copper, stranded
- 23 b. Voltage Capacity:  $\geq 300$  volts RMS
- 24 c. Current Capacity:  $\geq 5$  amps per conductor
- 25 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 26 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 30$  pF/ft
- 27 f. Jacket: CMP
- 28 2. Basis of Design: Belden 6300UE

- 1 F. Door Position Sensor Cable
- 2 1. 18 AWG, 2 conductor
- 3 a. Conductor Type: Bare copper, stranded
- 4 b. Voltage Capacity:  $\geq 300$  volts RMS
- 5 c. Current Capacity:  $\geq 5$  amps per conductor
- 6 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 7 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 30$  pF/ft
- 8 f. Jacket: CMP
- 9 2. Basis of Design: Belden 6300UE
- 10 G. Key Switch Cable
- 11 1. 18 AWG, 6 conductor
- 12 a. Conductor Type: Bare copper, stranded
- 13 b. Voltage Capacity:  $\geq 300$  volts RMS
- 14 c. Current Capacity:  $\geq 3.5$  amps per conductor
- 15 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 16 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 30$  pF/ft
- 17 f. Jacket: CMP
- 18 2. Basis of Design: Belden 6304UE
- 19 H. Key Switch Cable
- 20 1. 18 AWG, 4 conductor
- 21 a. Conductor Type: Bare copper, stranded
- 22 b. Voltage Capacity:  $\geq 300$  volts RMS
- 23 c. Current Capacity:  $\geq 3.5$  amps per conductor
- 24 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 25 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 30$  pF/ft
- 26 f. Jacket: CMP
- 27 2. Basis of Design: Belden 6302UE
- 28 I. Nurse Call Relay Integration Cable
- 29 1. 18 AWG, 2 conductor
- 30 a. Conductor Type: Bare copper, stranded

- 1 b. Voltage Capacity:  $\geq 300$  volts RMS
- 2 c. Current Capacity:  $\geq 5$  amps per conductor
- 3 d. Nominal Conductor DC Resistance:  $\leq 0.0065$  Ohms/ft
- 4 e. Nom. Capacitance, Conductor to Other Conductor:  $\leq 30$  pF/ft
- 5 f. Jacket: CMP
- 6 2. Basis of Design: Belden 6300UE
- 7 J. Ethernet Cable
- 8 1. 18 AWG, 2 conductor
- 9 a. EIA/TIA Category: Category 6
- 10 b. Jacket: CMP
- 11 2. Basis of Design: Belden 7882A

## 12 2.10 CONDUIT

- 13 A. All conduit for Electronic Access Control System cabling shall be a minimum of 1/2"
- 14 trade size.
- 15 B. Flexible conduit shall not be installed for Electronic Access Control System cabling.
- 16 C. Refer to Specification Section 26 05 33 for additional requirements.

## 17 2.11 INTERFACES AND INTEGRATIONS

- 18 A. Nurse Call.
- 19 1. Electronic Access Control system shall provide a unique, dedicated
- 20 supervised relay output to a unique, dedicated supervised relay input on the
- 21 Owner's existing Rauland Nurse Call system for each door listed in the
- 22 Access Control Schedule on the project documents.
- 23 2. Refer to Part 3 of this Specification Section for additional information.
- 24 B. Fire Alarm
- 25 1. Addressable Fire Alarm system relays shall be installed in-line in electrified
- 26 locking hardware circuits to interrupt power to locking hardware and unlock
- 27 controlled doors in the event of a fire alarm.

## 28 PART 3 - EXECUTION

### 29 3.1 INSTALLATION

- 30 A. Comply with the manufacturer's instructions and recommendations for installation of
- 31 all products.
- 32 B. Provide all system wiring between all components as directed by the manufacturer.

- 1 C. Network controllers shall be installed adjacent to existing system equipment, as  
2 indicated on the plans. Mount controllers to the structural walls, in a location  
3 coordinated with other utilities. Coordinate exact location with Owner and KJWW  
4 Engineering prior to installation. Provide +120 VAC emergency power circuit to the  
5 controllers using #12 AWG wiring from the nearest panelboard.
- 6 D. Mount all readers where shown on plans in accordance with Americans with  
7 Disabilities Act (ADA) requirements.
- 8 E. This Contractor shall be required to provide all cabling and hardware required for the  
9 interfacing of the access control system to other building systems, such as Nurse  
10 Call. This Contractor shall provide wiring up to the location of the remote system.  
11 The final terminations to remote system shall be made by the Contractor designated  
12 as the responsible party for that system.
- 13 F. Update all server and workstation programming and configuration to integrate new  
14 devices into existing system.
- 15 G. All low voltage security shall be routed and supported separately from all other  
16 telecommunications cabling.
- 17 H. Cabling shall be plenum rated when installed outside of conduit in plenum ceilings.

### 18 3.2 KEY SWITCHES

- 19 A. Configure and program Electronic Access Control system to facilitate automatic  
20 configuration of system-controlled doors in project areas for either one 16-bed unit  
21 operation or two 8-bed unit operation via key switches.
- 22 B. Desired mode of operation shall be user-selectable via mortise cylinder key switches  
23 in locations indicated on floor plans.
- 24 1. Key switches shall incorporate labeled LED indicator lights to continuously  
25 indicate selected mode of operation.
- 26 2. One LED indicator light shall be labeled, "One 16-Bed Unit" and the other  
27 shall be labeled, "Two 8-Bed Units".
- 28 3. System shall be configured and programmed such that the indicator lights  
29 accurately follow and annunciate the active mode of operation in real-time.
- 30 C. Modes of Operation
- 31 1. One 16-Bed Unit
- 32 a. In one 16-bed configuration, the outer set of interior unit double  
33 doors will be locked, and the two inner sets of interior unit double  
34 doors and the set of interior unit double doors in the dining areas  
35 will all be unlocked. Exterior unit patio doors will all be unlocked.  
36 Alarm-free travel through locked doors will be facilitated by  
37 credential readers. All locked doors will be unlocked in the event of  
38 a fire alarm.

- 1                   2.       Two 8-Bed Units
- 2                   a.       In two 8-bed configuration, all unit doors will be locked except the
- 3                                 outer set of interior unit double doors. Exterior unit patio doors will
- 4                                 all be unlocked. Alarm-free travel through locked doors will be
- 5                                 facilitated by credential readers. All locked doors will be unlocked in
- 6                                 the event of a fire alarm.
- 7    3.3    KEY OVERRIDE SWITCHES
- 8            A.       Configure and wire switches to interrupt power to electrified locking hardware at the
- 9                         associated door, to allow key-facilitated passage through the doorways in the event
- 10                         of an emergency.
- 11           B.       Configure and wire indicator lights to follow and annunciate whether the switch is
- 12                         interrupting power to the electrified locking hardware at the door.
- 13    3.4    INTERFACES AND INTEGRATIONS
- 14           A.       Nurse Call.
- 15                   1.       Provide a unique dedicated supervised relay output from the Electronic
- 16                                 Access Control system to a unique, dedicated supervised relay input on the
- 17                                 Owner's existing Rauland Nurse Call system for each door listed in the
- 18                                 Access Control Schedule on the project documents.
- 19                   2.       These relay connections shall be configured and programmed within both
- 20                                 systems to provide a unique door alarm notification for each door listed in
- 21                                 the Access Control Schedule on the project documents, to be annunciated
- 22                                 on the Owner's existing Ascom Nurse Call system wireless handsets.
- 23                   3.       Alarm notification shall be initiated via door position and magnetic bond
- 24                                 sensor inputs on the electronic Access Control system.
- 25                   4.       Alarm notification on handsets shall include a unique door identifier to direct
- 26                                 staff to the door in alarm.
- 27                   5.       All wiring, terminations, equipment, modules, accessories, configuration,
- 28                                 programming, and testing necessary for both the Electronic Access Control
- 29                                 system and the Nurse Call system to provide and complete this integration
- 30                                 and make it completely ready for operation shall be provided by This
- 31                                 Contractor.
- 32            B.       Fire Alarm
- 33                   1.       Addressable Fire Alarm system relays shall be installed in-line in electrified
- 34                                 locking hardware circuits to interrupt power to locking hardware and unlock
- 35                                 controlled doors in the event of a fire alarm.
- 36    3.5    FIELD QUALITY CONTROL
- 37            A.       Where these specifications require a product or assembly without the use of a brand
- 38                                 or trade name, provide a product that meets the requirements of the specifications,
- 39                                 as supplied and warranted by the system vendor. If the product or assembly is not
- 40                                 available from the system vendor, provide product or assembly as recommended by
- 41                                 the system vendor.

1 B. Periodic observations will be performed during construction to verify compliance with  
2 the requirements of the specifications. These services do not relieve the Contractor  
3 of responsibility for compliance with the Contract Documents.

#### 4 3.6 MANUFACTURER'S FIELD SERVICES

5 A. Installation shall be performed by a factory-trained and certified Contractor Installer.

6 B. The Installer shall provide a comprehensive, site-specific customer planning guide  
7 for the system. The installer shall conduct a conference with the Owner prior to any  
8 installation to discuss the programming options of the system and the planning  
9 guide. The result of this planning guide shall be the determination of the system  
10 access policies for each point.

11 C. The Installer shall include labor for all planning and all programming activities  
12 required to implement the Owner's access policies for each system point. Any  
13 software programmable access policy, within the bounds of the hardware specified,  
14 shall be included.

15 D. It shall be the responsibility of the Contractor/Installer to provide a complete,  
16 functional system as described by the design documents. These responsibilities  
17 include:

18 1. Complete hardware setup, installation, wiring and software configuration of  
19 the system server, all workstations and all peripheral hardware.

20 2. Complete programming of all operator software in accordance with the  
21 Owner's access policies determined by the planning guide conference.

22 3. Configuration of the Windows 2003 server network software for operation of  
23 the system. Templates shall be established representative of all user access  
24 right levels.

25 4. Programming of all custom graphic GUI screens including devices.

26 5. Complete system diagnostic verification.

27 E. The SMS Installation Contractor shall be present at two (2) two-hour meetings at the  
28 project site to coordinate all door hardware requirements with the door hardware  
29 vendor.

#### 30 3.7 SYSTEM ACCEPTANCE

31 A. The SMS Vendor shall submit for review a formal acceptance and system checkout  
32 program. The system checkout procedures shall include all system components and  
33 software, including but not limited to all system computers, field controllers, card  
34 reader devices, biometric readers and remote system interfaces. The Contractor  
35 shall perform the tests and document all results under the supervision of the  
36 manufacturer's systems engineer.

37 B. All operational scenarios, as defined by the customer planning guide, shall be tested  
38 to simulate the actual use of the system in the normal operating environment. The  
39 successful completion of these operational scenarios shall be documented.

1    3.8    SYSTEM DOCUMENTATION

2            A.    Complete documentation shall be provided for the system. The documentation shall  
3                describe:

- 4                1.    All operational parameters of the system.
- 5                2.    Complete documentation of programming and access policies.
- 6                3.    All data sets.
- 7                4.    Complete operating instructions for all hardware and software.

8            B.    The following sections shall be provided in the system documentation:

- 9                1.    System Administrator Manual: Provides an overview and a step-by-step  
10                guide and instructions detailing all system administrator responsibilities and  
11                functions.
- 12               2.    User Manual: A step-by-step guide and instructions detailing all system user  
13                functions.
- 14               3.    Alarm Monitoring Manual: A step-by-step guide and instructions detailing all  
15                alarm monitoring system functions and responsibilities.
- 16               4.    Technical Maintenance Manual: A comprehensive document providing all  
17                maintenance actions, system testing schedules, troubleshooting flowcharts,  
18                functional system layout, wiring diagrams, block diagrams and schematic  
19                diagrams.

20    END OF SECTION

1     **SECTION 28 31 00 - FIRE ALARM AND DETECTION SYSTEMS**

2     **PART 1 - GENERAL**

3     1.1     SECTION INCLUDES

4             A.     Fire alarm and detection systems

5     1.2     QUALITY ASSURANCE

6             A.     Installer: A factory-authorized licensed electrical or security contractor with five  
7                     years' experience in the design, installation and maintenance of fire alarm systems  
8                     by that manufacturer.

9             B.     Qualifications: The person managing/overseeing the preparation of shop drawings  
10                    and the system installation/programming/testing shall be trained and certified by the  
11                    system manufacturer and shall be Fire Alarm Certified by NICET, minimum Level 2.  
12                    This person's name and certification number shall appear on the start-up and testing  
13                    reports.

14    1.3     REFERENCES

15            A.     NFPA 70 - National Electrical Code

16            B.     NFPA 72 - National Fire Alarm and Signaling Code

17            C.     NFPA 101 - Life Safety Code

18    1.4     SUBMITTALS

19            A.     Submit shop drawings and product data under provisions of Section 26 05 00 and as  
20                    noted below.

21                   1.     Failure to comply with all of the following and all of the provisions in  
22                    26 05 00 will result in the shop drawing submittal being rejected without  
23                    review.

24                   2.     Failure to submit the fire alarm without all requirements fulfilled in a single  
25                    comprehensive submittal will be grounds to require a complete resubmittal.

26            B.     Provide product catalog data sheets as shop drawings.

27                   1.     Provide a product catalog data sheet for each item shown on the General  
28                    Electrical Equipment Schedule and for each piece of equipment that is not  
29                    shown on the drawings, but required for the operation of the system.

30                   2.     Where a particular General Electrical Equipment Schedule item has one or  
31                    more variations (such as those denoted by subscripts, etc) a separate  
32                    additional product catalog data sheet shall be provided for each variation  
33                    that requires a different part number to be ordered. The corresponding  
34                    General Electrical Equipment Schedule symbol shall be shown on the top of  
35                    each sheet.

36                   3.     Where multiple items and options are shown on one data sheet, the part  
37                    number and options of the item to be used shall be clearly denoted.

38            C.     Submit photocopy proof of NICET certification of the person overseeing the  
39                    preparation of drawings and installation/testing.

- 1 D. When required to comply with local or state regulatory reviews, the fire alarm  
2 submittal shall have a Professional Engineer's stamp and signature of the state in  
3 which the project is completed. NOTE: The Architect/Engineer cannot stamp and  
4 seal submittal drawings not prepared under their supervision.
- 5 1.5 DELIVERY, STORAGE, AND HANDLING
- 6 A. Deliver products to site under provisions of Section 26 05 00.
- 7 B. Store and protect products under provisions of Section 26 05 00.
- 8 1.6 REGULATORY REQUIREMENTS
- 9 A. System: UL or FM Global listed.
- 10 B. Conform to requirements of NFPA 101.
- 11 C. Conform to requirements of Americans with Disabilities Act (ADA).
- 12 D. Conform to UL 864 Fire Alarm and UL 1076 Security.
- 13 1.7 SYSTEM DESCRIPTION
- 14 A. Performance Statement: This specification section and the accompanying fire alarm  
15 specific design documents describe the minimum material quality, required features,  
16 and operational requirements of the system. These documents do not convey every  
17 wire that must be installed and every equipment connection that must be made.  
18 Based on the equipment described and the performance required of the system, as  
19 presented in these documents, the Vendor and the Contractor are solely responsible  
20 for determining all wiring, programming and miscellaneous equipment required for a  
21 complete and operational system.
- 22 B. Extending the existing fire alarm system: Provide all items, components, devices,  
23 hardware, software, programming, expansion components, conduit, wiring etc.  
24 needed to extend the existing fire alarm system. This includes but is not limited to  
25 additional power supplies, initiating devices and circuits, signaling devices and  
26 circuits, monitoring devices and circuits, auxiliary control and related devices such  
27 as, door holders and their control. The existing fire alarm system shall be extended  
28 such that the existing fire alarm system's functionality, integrity and annunciation  
29 shall be equivalent to pre-construction conditions unless noted otherwise. The  
30 functionality and integrity shall be maintained during construction.
- 31 C. Drawings: Only device layouts and some equipment have been shown on the  
32 contract drawings. Wiring and additional equipment to make a complete and  
33 functioning system has not been shown, but shall be submitted on the shop  
34 drawings.
- 35 1.8 PROJECT RECORD DOCUMENTS
- 36 A. Submit documents under the provisions of Section 26 05 00.
- 37 1.9 OPERATION AND MAINTENANCE DATA
- 38 A. Submit data under provisions of Section 26 05 00.
- 39 B. Include operating instructions, and maintenance and repair procedures.
- 40 C. Include shop drawings as reviewed by the Architect/Engineer and the local Authority  
41 Having Jurisdiction.

## 1 1.10 WARRANTY

2 A. Provide one (1) year warranty on all materials and labor from Date of Substantial  
3 Completion.

4 B. Warranty requirements shall include furnishing and installing all software upgrades  
5 issued by the manufacturer during the one (1) year warranty period.

6 **PART 2 - PRODUCTS**

## 7 2.1 SIGNALING LINE CIRCUIT DEVICES

## 8 A. Addressable Relays:

9 1. Relay that represents an addressable control point used primarily for the  
10 control of auxiliary devices as indicated on the drawings. Contractor to  
11 provide additional slave relay(s), as required, rated for the electrical load  
12 being controlled (contractor to match voltage, amps, etc.).

13 2. Relay shall connect directly to an SLC loop and receive power from a  
14 separate 24 VDC circuit.

15 3. The relay shall be mounted in an enclosure located in an accessible service  
16 location as near as possible to the device(s) being controlled, unless  
17 otherwise shown on the drawings. All mounting hardware shall be provided.

18 4. The relay shall supply 24 VDC power to the device(s) being controlled,  
19 unless otherwise indicated on the drawings.

## 20 2.2 WIRING

21 A. Fire alarm wiring/cabling shall be furnished and installed by the Contractor in  
22 accordance with the manufacturer's recommendations and pursuant to National Fire  
23 Codes. Cabling shall be UL listed and labeled as complying with NFPA 70, Article  
24 760 for power-limited fire alarm signal service.

## 25 B. Approved manufacturers of fire alarm cable:

- 26 1. Comtran Corp.  
27 2. Helix/HiTemp Cables, Inc.  
28 3. Rockbestos-Suprenant Cable Corp.  
29 4. West Penn Wire/CDT.

30 **PART 3 - EXECUTION**

## 31 3.1 SEQUENCES OF FIRE ALARM OPERATION

## 32 A. General:

33 1. All system output programs assigned via control-by-event equations to be  
34 activated by the particular point in alarm shall be executed, and the  
35 associated system outputs (alarm notification appliances and/or relays) shall  
36 be activated.

- 1 B. Card Reader Release Sequence:
- 2 1. The fire alarm system shall utilize an addressable relay to open the 'hold'
- 3 switch circuitry, integral to the card access device.
- 4 2. All card readers throughout the building shall release simultaneously.
- 5 3.2 INSTALLATION
- 6 A. Install system in accordance with manufacturer's instructions and referenced codes.
- 7 B. Devices:
- 8 1. General:
- 9 a. All ceiling-mounted devices shall be located where shown on the
- 10 reflected ceiling and floor plans. If not shown on the reflected ceiling
- 11 or reflected floor drawings, the devices shall be installed in the
- 12 relative locations shown on the floor drawings in a neat and uniform
- 13 pattern.
- 14 b. All devices shall be coordinated with luminaires, diffusers, sprinkler
- 15 heads, piping and other obstructions to maintain a neat and
- 16 operable installation. Mounting locations and spacing shall not
- 17 exceed the requirements of NFPA 72.
- 18 c. Where the devices are to be installed in a grid type ceiling system,
- 19 the detectors shall be centered in the ceiling tile.
- 20 d. The location of all fire alarm devices shall be coordinated with other
- 21 devices mounted in the proximity. Where a conflict arises with other
- 22 items or with architectural elements that will not allow the device to
- 23 be mounted at the location or height shown, the Contractor shall
- 24 adjust location of device so that new location meets all requirements
- 25 in NFPA 72 and all applicable building codes.
- 26 2. Addressable Relays and Monitor Modules:
- 27 a. Modules shall be located as near to the respective monitor or
- 28 control devices as possible, unless otherwise indicated on the
- 29 drawings.
- 30 b. All modules shall be mounted in or on a junction box in an
- 31 accessible location.
- 32 c. Where not visible from a floor standing position, a remote indicator
- 33 shall be installed to allow inspection of the device status from a local
- 34 floor standing location.
- 35 C. Wiring:
- 36 1. Fire alarm wiring/cabling shall be provided by the Contractor in accordance
- 37 with the manufacturer's recommendations and pursuant to National Fire
- 38 Codes.

- 1 2. Wiring shall be installed in conduit from device to above accessible ceilings.  
2 Exposed plenum-rated cable (FPLP) shall be used above accessible  
3 ceilings supported every 4 feet or run in cable trays (if applicable)  
4 maintaining a minimum of 5-inches clearance from all lighting ballasts. Fire  
5 alarm cabling shall not be installed in the same bridge rings or cable trays  
6 designated for the cabling of other systems.
- 7 3. All junction boxes shall be painted red with SLC and NAC circuits identified  
8 on cover.
- 9 4. Fire Alarm Power Branch Circuits: Building wiring as specified in Section  
10 26 05 13.
- 11 5. Notification Appliance Circuits shall not span floors or smoke compartments.  
12 Refer to architectural drawings for smoke compartments.
- 13 6. Signal line circuits connecting devices shall not span floors or two-hour  
14 smoke compartments.
- 15 7. No wiring other than that directly associated with fire alarm detection, alarm  
16 or auxiliary fire protection functions shall be in fire alarm conduits. Wiring  
17 splices shall be avoided to the extent possible, and if needed, they shall be  
18 made only in junction boxes, and enclosed by plastic wire nut type  
19 connectors. Transposing or changing color coding of wires shall not be  
20 permitted. All conductors in conduit containing more than one wire shall be  
21 labeled on each end, in all junction boxes, and at each device with "E-Z  
22 Markers" or equivalent. Conductors in cabinets shall be carefully formed  
23 and harnessed so that each drops off directly opposite to its terminal.  
24 Cabinet terminals shall be numbered and coded, and no unterminated  
25 conductors are permitted in cabinets or control panels. All controls, function  
26 switches, etc. shall be clearly labeled on all equipment panels.
- 27 D. Fire Alarm Cabling Color Code: Provide circuit conductors with insulation color  
28 coding as follows, or using colored tape at each conductor termination and in each  
29 junction box.
  - 30 1. Power branch circuit conductors: In accordance with Section 26 05 53.
  - 31 2. Signaling line circuit: Overall red jacket with black and red conductors.
  - 32 3. DC power supply circuit: Overall red jacket with violet and brown  
33 conductors.
  - 34 4. Notification appliance circuit: Overall red jacket with blue and white  
35 conductors.
  - 36 5. Door release circuit: Gray conductors.
  - 37 6. Central station trip circuit: Orange conductors.
  - 38 7. Central station fire alarm loop: Black and white conductors.
- 39 E. Devices surface mounted in finished areas shall be mounted on surface backboxes  
40 furnished by fire alarm equipment supplier. Backboxes shall be painted to match  
41 device, shall be the same shape and size as the device shall not have visible  
42 knockouts.
- 43 F. Make conduit and wiring connections to door release devices, sprinkler flow and  
44 pressure switches, sprinkler valve monitor switches, fire suppression system control  
45 panels, duct analog smoke detectors and all other system devices shown or noted  
46 on the Contract Documents or required in the manufacturer's product data and shop  
47 drawings.

- 1    3.3    FIELD QUALITY CONTROL
- 2            A.    Field inspection and testing will be performed under provisions of Section 26 05 00.
- 3            B.    Test in accordance with NFPA 72, Chapter 14 and local fire department  
4                requirements. Submit documentation with O & M manuals in accordance with  
5                Section 14.6 of the Code.
- 6    3.4    MANUFACTURER'S FIELD SERVICES
- 7            A.    Provide manufacturer's field services under provisions of Section 26 05 00.
- 8            B.    Include services of certified technician to supervise installation, adjustments, final  
9                connections, and system testing.
- 10           C.    Note that room numbers depicted on the architectural/engineering drawings will not  
11                necessarily reflect the actual room (signage) numbers that the Owner selects. The  
12                Contractor and fire alarm manufacturer shall coordinate the actual room numbers as  
13                the Owner directs to identify each device. This list shall be a part of the floor plan  
14                record drawing to be turned in at the project closeout.
- 15    END OF SECTION

1 **SECTION 31 10- 00 - SITE CLEARING**

2

3

4 **PART 1 - GENERAL**

5

6 RELATED DOCUMENTS

7

8 Drawings and general provisions of the Contract, including Construction Documents and  
9 Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this Section.

10

11 SUMMARY

12

13 Protecting existing trees and plants to remain.

14 Removing existing trees and plants.

15 Clearing and grubbing.

16 Disconnecting, capping or sealing, and removing site utilities.

17 Stripping and stockpiling topsoil.

18 Removing site improvements.

19

20 DEFINITIONS

21

22 Topsoil: Natural or cultivated surface soil layer containing organic matter and sand, silt, and clay  
23 particles that is friable, pervious, and reasonably free of clay lumps more than 2 inches in diameter;  
24 gravel, subsoil, weeds, roots, toxic materials, or other non-topsoil materials.

25

26 Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during  
27 construction, and defined by the drip line of individual trees or the perimeter drip line of groups of  
28 trees, unless otherwise indicated.

29

30 MATERIAL OWNERSHIP

31

32 Except for materials indicated to remain Owner's property, cleared materials will become  
33 Contractor's property and shall be removed from Project site.

34

35 PROJECT CONDITIONS

36

37 Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or  
38 used facilities during site-clearing operations.

39

40 Salvage: Carefully remove items indicated to be salvaged and store on premises in location  
41 approved by Owner.

42

43 Utility Locator Service: Notify utility locator service for area where Project is located before site  
44 clearing.

45

46 Erosion Control: Do not commence site-clearing operations until temporary erosion and  
47 sedimentation control measures are in place.

48

49

50 **PART 2 - PRODUCTS (Not used)**

51

52

53 **PART 3 - EXECUTION**

54

55 PREPARATION

56

57 Protect and maintain benchmarks and survey control points from disturbance during construction.

58

- 1 Locate and clearly flag trees and vegetation to remain or to be relocated.  
2  
3 Protect existing site improvements to remain from damage during construction.  
4
- 5 **TREE PROTECTION**  
6
- 7 Erect and maintain temporary fencing around tree protection zones before starting site clearing.  
8 Remove fences when construction is complete.  
9
- 10 Do not store construction materials, debris, or excavated material within fenced area.  
11  
12 Do not permit vehicles, equipment, or foot traffic within fenced area.  
13  
14 Maintain fenced area free of weeds and trash.  
15
- 16 Where excavation for new construction is required within tree protection zones, clear and excavate  
17 by hand methods to minimize damage to root systems. Use narrow-tine spading forks, comb soil to  
18 expose roots, and cleanly cut roots as close to excavation as possible.  
19
- 20 Cover exposed roots with burlap and water regularly.  
21  
22 Temporarily support and protect roots from damage until they are permanently redirected  
23 and covered with soil.  
24
- 25 Coat cut faces of roots more than 1-1/2 inches in diameter with emulsified asphalt or other  
26 approved coating formulated for use on damaged plant tissues.  
27
- 28 Back-fill with soil, as soon as possible.  
29
- 30 **CLEARING AND GRUBBING**  
31
- 32 Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new  
33 construction.  
34
- 35 Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.  
36
- 37 Cut minor roots and branches of trees indicated to remain in a clean and careful manner  
38 where such roots and branches obstruct installation of new construction.  
39
- 40 Grind stumps and remove roots, obstructions, and debris extending to a minimum depth of  
41 18 inches below exposed sub-grade.  
42
- 43 **UTILITIES**  
44
- 45 Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.  
46
- 47 Arrange with utility companies to shut off utilities as required for performance of the work.  
48
- 49 Do not interrupt utilities serving occupied facilities unless permitted under the following conditions  
50
- 51 Notify Architect not less than two days in advance of proposed utility interruptions.  
52
- 53 Do not proceed with utility interruptions without Architect's written permission.  
54
- 55 Excavate for and remove underground utilities indicated to be removed.  
56
- 57 **TOPSOIL STRIPPING**  
58

- 1 Limit topsoil striping to areas required to be disturbed for Project construction.  
2  
3 Remove sod and grass before stripping topsoil.  
4  
5 Strip topsoil to depths encountered.  
6  
7 Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade  
8 and shape stockpiles to drain surface water. Cover to prevent windblown dust.  
9  
10 Limit height of topsoil stockpiles to 72 inches.  
11  
12 Do not stockpile topsoil within tree protection zones.  
13  
14 **SITE IMPROVEMENTS**  
15  
16 Remove existing improvements as required for new construction and elsewhere as indicated.  
17  
18 Remove below grade construction to 12 inches below elevation required for excavation for  
19 new construction or to at least 12 inches below final grade.  
20  
21 Neatly saw cut existing pavement at termination line before removal. Saw-cut faces  
22 vertically.  
23  
24 Paint cut ends of steel reinforcement to remain with liquid, two-part, epoxy coating complying  
25 with ASTM A 775/A 775M to prevent corrosion.  
26  
27 **RESTORATION**  
28 Restore damaged improvements to their original condition.  
29  
30 Repair or replace trees and vegetation indicated to remain that are damaged by construction  
31 operations.  
32  
33 Employ an arborist, licensed in jurisdiction where Project is located, to submit details of  
34 proposed repairs and to repair damage to trees and shrubs.  
35  
36 Replace trees that cannot be repaired and restored to full-growth status.  
37  
38  
39 **END OF SECTION**

1     **SECTION 31 20 00 – EARTH MOVING**

2

3

4     **PART 1 - GENERAL**

5

6     **RELATED DOCUMENTS**

7

8     Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9     and Division 01 Specification Sections, apply to this Section.

10

11     **SUMMARY**

12

13     Preparing sub grades for slabs-on-grade, walks, pavements, lawns and grasses and exterior plants.

14     Excavating and backfilling for buildings and structures.

15     Drainage course for slabs-on-grade.

16     Sub base course for concrete walks and pavements.

17     Sub base course for asphalt paving.

18     Excavating and backfilling of utility trenches.

19     Excavating and backfilling trenches for buried mechanical and electrical utilities and pits for buried  
20     utility structures.

21

22     Related Sections include:

23

24             Division 31 Section "Site Clearing" for protection of existing trees indicated to remain, site  
25             clearing and grubbing, stripping and stockpiling topsoil, and removal of site  
26             improvements.

27

28     **DEFINITIONS**

29

30     Backfill: Soil material or controlled low-strength material used to fill an excavation.

31

32     Base Course: Course placed between the sub-base course and hot-mix asphalt paving.

33

34     Bedding Course: Course placed over the excavated sub-grade in a trench before laying pipe.

35

36     Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

37

38     Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of  
39     pore water.

40

41     Excavation: Removal of material encountered above sub-grade elevations and to lines and  
42     dimensions indicated.

43

44             Unauthorized Excavation: Excavation below sub-grade elevations or beyond indicated lines  
45             and dimensions without direction by Architect. Unauthorized excavation, as well as remedial  
46             work directed by Architect, shall be without additional compensation.

47

48     Fill: Soil materials used to raise existing grades.

49

50     Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and  
51     electrical appurtenances, or other man-made stationary features constructed above or below the  
52     ground surface.

53

54     Sub-base Course: Course placed between the sub-grade and base course for hot-mix asphalt  
55     pavement, or course placed between the sub-grade and a cement concrete pavement or a cement  
56     concrete or hot-mix asphalt walk.

57

1 Sub-grade: Surface or elevation remaining after completing excavation, or top surface of a fill or  
2 backfill immediately below sub-base, drainage fill, or topsoil materials.

3  
4 Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services  
5 within buildings.

## 6 7 SUBMITTALS

8  
9 Product Data: For controlled low-strength material, including design mixture.

10  
11 Material Test Reports: From a qualified testing agency indicating and interpreting test results for  
12 compliance of the following with requirements indicated:

13  
14 Classification according to ASTM D 2487 of each on-site and borrow soil material proposed  
15 for fill and backfill.

## 16 17 QUALITY ASSURANCE

18  
19 Geotechnical Testing Agency Qualifications: A testing agency qualified according to ASTM E 329 to  
20 conduct soil materials testing, as documented according to ASTM D 3740 and ASTM E 548.

21  
22 Pre-excavation Conference: Conduct conference at Project site to comply with requirements in  
23 Division 1 Section "Project Management and Coordination."

## 24 25 PROJECT CONDITIONS

26  
27 Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless  
28 permitted in writing by Architect and then only after arranging to provide temporary utility services  
29 according to requirements indicated.

30  
31 Notify Architect not less than two days in advance of proposed utility interruptions.

32  
33 Do not proceed with utility interruptions without Architect's written permission.

34  
35 Contact utility-locator service for area where Project is located before excavating.

## 36 37 38 **PART 2 - PRODUCTS**

### 39 40 SOIL MATERIALS

41  
42 General: Provide borrow soil materials when sufficient satisfactory soil materials are not available  
43 from excavations.

44  
45 Satisfactory Soils: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a  
46 combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris,  
47 waste, frozen materials, vegetation, and other deleterious matter.

48  
49 Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT  
50 according to ASTM D 2487, or a combination of these groups.

51  
52 Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of  
53 optimum moisture content at time of compaction.

54  
55 Sub-base Material: Approved Naturally or artificially graded mixture of natural or crushed gravel,  
56 crushed stone and natural or crushed sand; subsection 212.2 of the State of Wisconsin Department  
57 of Transportation Standard Specifications for Highway and Structure Construction, 1996 Edition; or  
58 engineered fill.

1  
2 Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone,  
3 and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and  
4 not more than 12 percent passing a No. 200 sieve.

5  
6 Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone,  
7 and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not  
8 more than 8 percent passing a No. 200 sieve.

9  
10 Drainage Fill: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel;  
11 ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0  
12 to 5 percent passing a No. 8 sieve.

13  
14 **CONTROLLED LOW-STRENGTH MATERIAL**

15  
16 Low-density, self-compacting, flowable concrete material as follows:

17  
18 Portland Cement: ASTM C 150, Type I II or III.  
19 Fly Ash: ASTM C 618, Class C or F.  
20 Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.  
21 Water: ASTM C 94/C 94M.  
22 Air-Entraining Admixture: ASTM C 260.

23  
24 Compressive Strength: 80-psi when tested according to ASTM C 495.

25

26

27 **PART 3 - EXECUTION**

28

29 **PREPARATION**

30

31 Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by  
32 settlement, lateral movement, undermining, washout, and other hazards created by earthwork  
33 operations.

34

35 Protect and maintain erosion and sedimentation controls during earthwork operations.

36

37 Provide protective insulating materials to protect sub-grades and foundation soils against freezing  
38 temperatures or frost.

39

40 **DEWATERING**

41

42 Prevent surface water and ground water from entering excavations, from ponding on prepared sub-  
43 grades, and from flooding Project site and surrounding area.

44

45 Protect sub-grades from softening, undermining, washout, and damage by rain or water  
46 accumulation.

47

48 Reroute surface water runoff away from excavated areas. Do not allow water to accumulate  
49 in excavations. Do not use excavated trenches as temporary drainage ditches.

50

51 **EXCAVATION, GENERAL**

52

53 Explosives: Do not use explosives.

54

55 Excavate to subgrade elevations. Material to be excavated will be classified as earth or rock.

56

57 Earth excavation includes excavating soil, boulders and other materials not classified as rock  
58 or unauthorized excavation.

- 1  
2 Intermittent drilling, ram hammering or ripping of material not classified as rock excavation is  
3 earth excavation.  
4
- 5 EXCAVATION FOR STRUCTURES  
6
- 7 Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If  
8 applicable, extend excavations a sufficient distance from structures for placing and removing  
9 concrete formwork, for installing services and other construction, and for inspections.  
10
- 11 Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate  
12 by hand to final grade just before placing concrete reinforcement. Trim bottoms to required  
13 lines and grades to leave solid base to receive other work.  
14
- 15 EXCAVATION FOR WALKS AND PAVEMENTS  
16
- 17 Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and  
18 sub-grades.  
19
- 20 EXCAVATION FOR UTILITY TRENCHES  
21
- 22 Excavate trenches to indicated gradients, lines, depths, and elevations.  
23
- 24 Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost  
25 line.  
26
- 27 Excavate trenches to uniform widths to provide 12-inches clearance on each side of pipe or conduit.  
28 Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit,  
29 unless otherwise indicated.  
30
- 31 Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe elevation to allow for  
32 bedding course. Hand excavate for bell of pipe.  
33
- 34 SUBGRADE INSPECTION  
35
- 36 Notify Architect when excavations have reached required subgrade.  
37
- 38 If Architect determines that unsatisfactory soil is present, continue excavation and replace with  
39 compacted backfill or fill material as directed.  
40
- 41 Proof-roll sub-grade below the building slabs and pavements with heavy pneumatic-tired equipment  
42 to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated sub-grades.  
43
- 44 Completely proof-roll sub-grade in one direction, repeating proof-rolling in direction  
45 perpendicular to first direction. Limit vehicle speed to 3 mph.  
46
- 47 Proof-roll with a loaded 10-wheel tandem-axle dump-truck weighing not less than 15 tons.  
48
- 49 Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as  
50 determined by Architect, and replace with compacted backfill or fill as directed.  
51
- 52 Authorized additional excavation and replacement material will be paid for according to Contract  
53 provisions for changes in the Work.  
54
- 55 Reconstruct sub-grades damaged by freezing temperatures, frost, rain, accumulated water, or  
56 construction activities, as directed by Architect, without additional compensation.  
57
- 58 UNAUTHORIZED EXCAVATION

- 1  
2 Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of  
3 concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill,  
4 with 28-day compressive strength of 2500 psi, may be used when approved by Architect.  
5  
6 Fill unauthorized excavations under other construction or utility pipe as directed by Architect.  
7  
8 **STORAGE OF SOIL MATERIALS**  
9  
10 Stockpile borrow-soil materials and excavated satisfactory soil materials without intermixing. Place,  
11 grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.  
12  
13 Stockpile soil materials away from edge of excavations. Do not store within drip line of  
14 remaining trees.  
15  
16 **FILL, GENERAL**  
17  
18 Place fill, including back-fill, sub-base and drainage courses, on sub-grades free of mud, frost, snow,  
19 or ice.  
20  
21 **BACKFILL**  
22  
23 Place and compact backfill in excavations promptly, but not before completing the following:  
24  
25 Construction below finish grade including, where applicable, sub-drainage, damp proofing,  
26 waterproofing, and perimeter insulation.  
27 Surveying locations of underground utilities for Record Documents.  
28 Testing and inspecting underground utilities.  
29 Removing concrete formwork.  
30 Removing trash and debris.  
31 Removing temporary shoring and bracing, and sheeting.  
32 Installing permanent or temporary horizontal bracing on horizontally supported walls.  
33  
34 **UTILITY TRENCH BACKFILL**  
35  
36 Place and compact bedding course on trench bottoms and where indicated. Shape bedding course  
37 to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies  
38 of conduits.  
39  
40 Backfill trenches excavated under footings, up to 18 inches below bottom of footings, with  
41 satisfactory soil; fill with concrete to elevation of bottom of footings.  
42  
43 Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below  
44 surface of roadways. After installing and testing, completely encase piping or conduit in a minimum  
45 of 4 inches of concrete before backfilling or placing roadway sub-base.  
46  
47 Place and compact initial backfill of engineered fill, free of particles larger than 1 inch in any  
48 dimension, or Controlled Low-Strength Material, to a height of 12 inches over the utility pipe or  
49 conduit.  
50  
51 Carefully compact initial engineered fill backfill under pipe haunches and compact evenly up  
52 on both sides and along the full length of utility piping or conduit to avoid damage or  
53 displacement of piping or conduit. Coordinate backfilling with utilities testing.  
54  
55 Backfill voids with satisfactory soil while installing and removing shoring and bracing.  
56  
57 Place and compact final backfill of satisfactory soil to final sub-grade elevation.  
58

- 1 SOIL FILL  
2
- 3 Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill  
4 material will bond with existing material.  
5
- 6 Place and compact fill material in layers to required elevations as follows:  
7
- 8 Under grass and planted areas, use satisfactory soil material.  
9 Under walks and pavements, use sub-base material.  
10 Under steps and ramps, use engineered fill.  
11 Under building slabs, use engineered fill.  
12
- 13 SOIL MOISTURE CONTROL  
14
- 15 Uniformly moisten or aerate sub-grade and each subsequent fill or backfill soil layer before  
16 compaction to within 2 percent of optimum moisture content.  
17
- 18 Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds  
19 optimum moisture content by 2 percent and is too wet to compact to specified dry unit  
20 weight.  
21
- 22 COMPACTION OF BACKFILLS AND FILLS  
23
- 24 Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material  
25 compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material  
26 compacted by hand-operated tampers.  
27
- 28 Place backfill and fill soil materials evenly on all sides of structures to required elevations, and  
29 uniformly along the full length of each structure.  
30
- 31 Compact soil materials to not less than the following percentages of maximum dry unit weight  
32 according to ASTM D 1557:  
33
- 34 Under structures, building slabs, steps, and pavements, scarify and re-compact top 12  
35 inches of existing sub-grade and each layer of backfill or fill soil material at 95 percent.  
36
- 37 Under walkways, scarify and re-compact top 6 inches below sub-grade and compact each  
38 layer of backfill or fill soil material at 92 percent.  
39
- 40 Under lawn or unpaved areas, scarify and re-compact top 6 inches below sub-grade and  
41 compact each layer of backfill or fill soil material at 85 percent.  
42
- 43 GRADING  
44
- 45 General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with  
46 compaction requirements and grade to cross sections, lines, and elevations indicated.  
47
- 48 Provide a smooth transition between adjacent existing grades and new grades.  
49
- 50 Cut out soft spots, fill low spots, and trim high spots to comply with required surface  
51 tolerances.  
52
- 53 Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish sub-  
54 grades to required elevations within the following tolerances:  
55
- 56 Lawn or Unpaved Areas: Plus or minus 1 inch.  
57
- 58 Walks: Plus or minus 1 inch.

- 1  
2 Pavements: Plus or minus 1/2 inch.  
3  
4 Grading inside Building Lines: Finish sub-grade to a tolerance of 1/2-inch when tested with a 10-foot  
5 straightedge and 3/4-inch over the entire excavation.  
6  
7 SUBBASE COURSES  
8  
9 On prepared sub-grade, place sub-base course under pavements and walks as follows:  
10  
11 Shape sub-base course to required crown elevations and cross-slope grades.  
12  
13 Place sub-base course 6 inches or less in compacted thickness in a single layer.  
14  
15 Place sub-base course that exceeds 6 inches in compacted thickness in layers of equal  
16 thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.  
17  
18 Compact sub-base course at optimum moisture content to required grades, lines, cross  
19 sections, and thickness to not less than 95 percent of maximum dry unit weight according to  
20 ASTM D 1557.  
21  
22 Pavement Shoulders: Place shoulders along edges of sub-base and base course to prevent lateral  
23 movement. Construct shoulders, at least 12 inches wide, of satisfactory soil materials and compact  
24 simultaneously with each sub-base and base layer to not less than 95 percent of maximum dry unit  
25 weight according to ASTM D 1557.  
26  
27 DRAINAGE COURSE  
28  
29 On prepared sub-grade, place and compact drainage fill under cast-in-place concrete slabs-on-grade  
30 as follows:  
31  
32 Place drainage course 6 inches or less in compacted thickness in a single layer.  
33  
34 Place drainage course that exceeds 6 inches in compacted thickness in layers of equal  
35 thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.  
36  
37 Compact each layer of drainage course to required cross sections and thickness to not less  
38 than 95 percent of maximum dry unit weight according to ASTM D 698.  
39  
40 FIELD QUALITY CONTROL  
41  
42 Testing Agency: Engage a qualified geotechnical engineering testing agency to perform field quality  
43 control testing.  
44  
45 Allow testing agency to inspect and test sub-grades and each fill or backfill layer. Proceed  
46 with subsequent earthwork only after test results for previously completed work show  
47 compliance with requirements.  
48  
49 Footing Sub-grade: At footing sub-grades, at least one test of each soil stratum shall be performed  
50 to verify design bearing-capacities. Subsequent verification and approval of other footing sub-grades  
51 may be based on a visual comparison of sub-grade with tested sub-grade when approved by  
52 Architect.  
53  
54 Testing agency shall test compaction of soils in place according to ASTM D 1556, ASTM D 2167,  
55 ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations  
56 and frequencies:  
57

1 Paved and Building Slab Areas: At sub-grade and at each compacted fill and backfill layer,  
2 at least one (1) test for every 2500 sq. ft. or less of paved area or building slab, but in no  
3 case fewer than three (3) tests.  
4

5 Foundation Wall Backfill: At each compacted backfill layer, at least one (1) test for each 100  
6 feet or less of wall length, but no fewer than two (2) tests.  
7

8 Trench Backfill: At each compacted initial and final backfill layer, at least one (1) test for  
9 each 150 feet or less of trench length, but no fewer than two (2) tests.  
10

11 When testing agency reports that sub-grades, fills, or backfills have not achieved degree of  
12 compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required;  
13 re-compact and retest until specified compaction is obtained.  
14

#### 15 PROTECTION

16

17 Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free  
18 of trash and debris.  
19

20 Repair and reestablish grades to tolerances specified where completed or partially completed  
21 surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent  
22 construction operations or weather conditions.  
23

24 Where settling occurs before Project correction period elapses, remove finished surfacing, backfill  
25 with additional soil material, compact, and reconstruct surfacing.  
26

27 Restore appearance, quality, and condition of finished surfacing to match adjacent work, and  
28 eliminate evidence of restoration to greatest extent possible.  
29

#### 30 DISPOSAL OF SURPLUS AND WASTE MATERIALS

31

32 Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash,  
33 and debris, and legally dispose of it off Owner's property.  
34

35  
36 END OF SECTION

1    **SECTION 32 13 13 - CONCRETE PAVING**

2  
3  
4    **PART 1 - GENERAL**

5  
6    RELATED DOCUMENTS

7  
8    Drawings and general provisions of the Contract, including Construction Documents and  
9    Supplementary Conditions and Division 00 & 01 Specification Sections, apply to this Section.

10  
11   SUMMARY

12  
13   Exterior cement concrete pavement including:

14  
15       Walkways  
16       Curbs and gutters

17  
18   Related Sections include:

19  
20       Division 03 Section "Cast-in-Place Concrete" for concrete materials and mix requirements.  
21       Division 32 Section "Earth Moving" for sub-grade preparation, grading and sub-base course

22  
23   SUBMITTALS

24  
25   Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when  
26   characteristics of materials, Project conditions, weather, test results, or other circumstances warrant  
27   adjustments.

28  
29   Field quality-control test reports.

30  
31   QUALITY ASSURANCE

32  
33   Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with  
34   ASTM C 94/C 94M requirements for production facilities and equipment.

35  
36   Testing Agency Qualifications: An agency qualified according to ASTM C 1077 and ASTM E 329 for  
37   testing indicated, as documented according to ASTM E 548.

38  
39   ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by  
40   requirements in the Contract Documents.

41  
42  
43   **PART 2 - PRODUCTS**

44  
45   FORMS

46  
47   Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to  
48   provide full-depth, continuous, straight, smooth exposed surfaces.

49  
50       Use flexible or curved forms for curves with a radius 100 feet or less.

51  
52   Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or  
53   adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

54  
55   STEEL REINFORCEMENT

56  
57   Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat  
58   sheets.

- 1  
2 Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.  
3  
4 Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with  
5 ends square and free of burrs.  
6  
7 Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening  
8 reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports  
9 according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of  
10 greater compressive strength than concrete, and as follows:

11  
12 CURING MATERIALS

- 13  
14 Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to  
15 fresh concrete.

16  
17 Products:

- 18  
19 Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.  
20 Euclid Chemical Company (The); Eucobar.  
21 Kaufman Products, Inc.; Vapor Aid.  
22 L&M Construction Chemicals, Inc.; E-Con.  
23 Meadows, W. R., Inc.; Sealtight Evapre.  
24 Sika Corporation, Inc.; SikaFilm.

- 25  
26 White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

27  
28 Products:

- 29  
30 Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.  
31 Euclid Chemical Company (The); Kurez VOX White Pigmented.  
32 Kaufman Products, Inc.; Thinfilm 450.  
33 L&M Construction Chemicals, Inc.; L&M Cure R-2.  
34 Meadows, W. R., Inc.; 1200-White.

35  
36 RELATED MATERIALS

- 37  
38 Expansion-Joint and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or  
39 ASTM D 1752, cork or self-expanding cork.

- 40  
41 Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- 42  
43 Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and  
44 bonding to damp surfaces, of class suitable for application temperature and of grade to  
45 requirements, and as follows:

- 46  
47 Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to  
48 hardened concrete.

- 49  
50 Detectable Warning Surfaces: Tactile pattern of raised, truncated domes complying with  
51 ANSI A117.1 (705.3.1).

52  
53 Available Manufacturers:

54  
55 Pre-Cast Concrete Pavers

- 56  
57 Mutual Materials  
58 Tile Tech Pavers

1  
2                   Vitrified Polymer Composite Panels

3  
4                   ADA Solutions Inc.  
5                   Armor-Tile

6  
7 **CONCRETE MIXTURES**

8  
9 Engage a qualified testing agency to design concrete mixtures.

10  
11 Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to  
12 ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

13  
14                   For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not  
15 more than 5 minutes after ingredients are in mixer, before any part of batch is released.

16  
17                   For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each  
18 additional 1 cu. yd.

19  
20                   Provide batch ticket for each batch discharged and used in the Work, indicating Project  
21 identification name and number, date, mixture type, mixing time, quantity, and amount of  
22 water added.

23  
24  
25 **PART 3 - EXECUTION**

26  
27 **EXAMINATION**

28  
29 Examine exposed subgrades and subbase surfaces for compliance with requirements for  
30 dimensional, grading and elevation tolerances.

31  
32 Proof-roll prepared subbase surface below concrete pavements to identify soft pockets and areas of  
33 excess yielding.

34  
35                   Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require  
36 correction according to requirements in Division 2 Section "Earth Moving."

37  
38 Proceed with concrete pavement operations only after nonconforming conditions have been  
39 corrected and subgrade is ready to receive pavement.

40  
41 **PREPARATION**

42  
43 Remove loose material from compacted subbase surface immediately before placing concrete.

44  
45 **EDGE FORMS AND SCREED CONSTRUCTION**

46  
47 Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to  
48 required lines, grades, and elevations. Install forms to allow continuous progress of work and so  
49 forms can remain in place at least 24 hours after concrete placement.

50  
51 Clean forms after each use and coat with form-release agent to ensure separation from concrete  
52 without damage.

53  
54 **STEEL REINFORCEMENT**

55  
56 Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting  
57 reinforcement.

58

- 1 Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.  
2
- 3 Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one  
4 full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in  
5 either direction.  
6
- 7 JOINTS  
8
- 9 General: Form construction, isolation, and contraction joints and tool edgings true to line with faces  
10 perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline,  
11 unless otherwise indicated.  
12
- 13 When joining existing pavement, place transverse joints to align with previously placed  
14 joints, unless otherwise indicated.  
15
- 16 Construction Joints: Provide construction joints at side and end terminations of pavement and at  
17 locations where pavement operations are stopped for more than one-half hour unless pavement  
18 terminates at isolation joints.  
19
- 20 Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless  
21 otherwise indicated. Embed keys at least 1-1/2 inches into concrete.  
22
- 23 Isolation and Expansion Joints: Form joints using preformed joint-filler strips.  
24
- 25 Provide isolation joints abutting concrete curbs, catch basins, manholes, inlets,  
26 structures, walks, other fixed objects, and where indicated.  
27
- 28 Provide expansion joints at minimum intervals of 50 feet, unless otherwise indicated  
29 on Drawings.  
30
- 31 Extend joint fillers full width and depth of joint.  
32
- 33 Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint  
34 sealant is indicated.  
35
- 36 Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.  
37
- 38 Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or  
39 clip joint-filler sections together.  
40
- 41 Protect top edge of joint filler during concrete placement with metal, plastic, or other  
42 temporary preformed cap. Remove protective cap after concrete has been placed on both  
43 sides of joint.  
44
- 45 Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as  
46 indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete  
47 thickness, as follows. Where applicable, match jointing of existing adjacent concrete pavement:  
48
- 49 Grooved Joints: Form contraction joints after initial floating by grooving and finishing each  
50 edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints  
51 after applying surface finishes. Eliminate groover marks on concrete surfaces.  
52
- 53 Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an  
54 edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate  
55 tool marks on concrete surfaces.  
56
- 57 CONCRETE PLACEMENT  
58

- 1 Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement,  
2 and items to be embedded or cast in. Notify other trades to permit installation of their work.  
3
- 4 Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not  
5 place concrete on frozen surfaces.  
6
- 7 Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place  
8 concrete around manholes or other structures until they are at required finish elevation and  
9 alignment.  
10
- 11 Comply with ACI 301 requirements for measuring, mixing, transporting and placing concrete.  
12
- 13 Do not add water to concrete during delivery or at Project site.  
14
- 15 Deposit and spread concrete in a continuous operation between transverse joints. Do not push or  
16 drag concrete into place or use vibrators to move concrete into place.  
17
- 18 Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by  
19 hand spading, rodding, or tamping.  
20
- 21 Consolidate concrete along face of forms and adjacent to transverse joints with an internal  
22 vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only  
23 square-faced shovels for hand spreading and consolidation. Consolidate with care to  
24 prevent dislocating reinforcement, dowels, and joint devices.  
25
- 26 Screed pavement surfaces with a straightedge and strike off.  
27
- 28 Commence initial floating using bull floats or darbies to impart an open textured and uniform surface  
29 plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete  
30 surfaces before beginning finishing operations or spreading surface treatments.  
31
- 32 Curbs and Gutters: When automatic machine placement is used for curb and gutter placement,  
33 submit revised mix design and laboratory test results that meet or exceed requirements. Produce  
34 curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed  
35 concrete. If results are not approved, remove and replace with formed concrete.  
36
- 37 Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from  
38 physical damage or reduced strength that could be caused by frost, freezing actions, or low  
39 temperatures.  
40
- 41 When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat  
42 water and aggregates before mixing to obtain a concrete mixture temperature of not less  
43 than 50 deg F and not more than 80 deg F at point of placement.  
44
- 45 Do not use frozen materials or materials containing ice or snow.  
46
- 47 Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical  
48 accelerators unless otherwise specified and approved in mix designs.  
49
- 50 Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:  
51
- 52 Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of  
53 placement. Chilled mixing water or chopped ice may be used to control temperature,  
54 provided water equivalent of ice is calculated to total amount of mixing water. Using liquid  
55 nitrogen to cool concrete is Contractor's option.  
56
- 57 Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed  
58 ambient air temperature immediately before embedding in concrete.

1

2

Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3

4

5

## FINISHING

6

7

General: Do not add water to concrete surfaces during finishing operations.

8

9

10

11

12

13

14

Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.

15

16

17

Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

18

19

20

21

22

Detectable Warning Surfaces: At curb cuts and other locations indicated or required by code, provide stamped cast-in-place concrete, pre-cast concrete pavers or cast-in vitrified polymer composite panels complying with ANSI A117.1 (705.3.1).

23

24

25

26

27

## CONCRETE PROTECTION AND CURING

28

29

30

31

32

33

General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

34

35

36

37

38

39

40

41

42

43

44

45

46

47

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52

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56

57

58

Comply with ACI 306.1 for cold-weather protection.

Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

Curing Compound: Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

## PAVEMENT TOLERANCES

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

Comply with tolerances of ACI 117 and as follows:

Elevation: 1/4 inch.

Thickness: Plus 3/8 inch, minus 1/4 inch.

Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.

Joint Spacing: 3 inches.

Contraction Joint Depth: Plus 1/4 inch, no minus.

Joint Width: Plus 1/8 inch, no minus.

## FIELD QUALITY CONTROL

53

54

55

56

57

58

Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

Testing Frequency: Obtain at least 1 composite sample per ASTM C 172 for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.

- 1  
2           When frequency of testing will provide fewer than five compressive-strength tests for each  
3 concrete mixture, testing shall be conducted from at least five randomly selected batches or  
4 from each batch if fewer than five are used.  
5
- 6   Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not  
7 less than one test for each day's pour of each concrete mix. Perform additional tests when concrete  
8 consistency appears to change.  
9
- 10   Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than  
11 one test for each day's pour of each concrete mix.  
12
- 13   Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below  
14 and when 80 deg F and above, and one test for each composite sample.  
15
- 16   Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard  
17 cylinder specimens for each composite sample.  
18
- 19   Compressive-Strength Tests: ASTM C 39; test 1 specimen at 7 days and 2 specimens at 28 days.  
20
- 21           A compressive-strength test shall be the average compressive strength from 2 specimens  
22 obtained from same composite sample and tested at 28 days.  
23
- 24           Strength of each concrete mix will be satisfactory if average of any 3 consecutive  
25 compressive-strength tests equals or exceeds specified compressive strength and no  
26 compressive-strength test value falls below specified compressive strength by more than  
27 500 psi.  
28
- 29   Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 48  
30 hours of testing. Reports of compressive-strength tests shall contain Project identification name and  
31 number, date of concrete placement, name of concrete testing and inspecting agency, location of  
32 concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and  
33 materials, compressive breaking strength, and type of break for both 7- and 28-day tests.  
34
- 35   Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be  
36 permitted by Architect but will not be used as sole basis for approval or rejection of concrete.  
37
- 38   Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test  
39 results indicate that slump, air entrainment, compressive strengths, or other requirements have not  
40 been met, as directed by Architect.  
41
- 42   Remove and replace concrete pavement where test results indicate that it does not comply with  
43 specified requirements.  
44
- 45   Additional testing and inspecting, at Contractor's expense, will be performed to determine  
46 compliance of replaced or additional work with specified requirements.  
47
- 48   REPAIRS AND PROTECTION  
49
- 50   Remove and replace concrete pavement that is broken, damaged, or defective or that does not  
51 comply with requirements in this Section.  
52
- 53   Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or  
54 defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete  
55 bonded to pavement with epoxy adhesive.  
56

- 1 Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
- 2 When construction traffic is permitted, maintain pavement as clean as possible by removing surface
- 3 stains and spillage of materials as they occur.
- 4
- 5 Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep
- 6 concrete pavement not more than two days before date scheduled for Substantial Completion
- 7 inspections.
- 8
- 9
- 10 END OF SECTION
- 11

1 **APPENDIX: FOR EXPOSED AGGREGATE AND COLORED FINISHES**

2  
3 Samples: 10-lb sample of exposed aggregate.

4  
5 Mockup: Cast mockup of full-size section of concrete pavement to demonstrate typical joints,  
6 surface finish, texture, color, and standard of workmanship.

7  
8 Build 5-feet x 5-feet mockup in location approved by Architect.

9  
10 Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious  
11 reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate  
12 as follows:

13  
14 Aggregate Sizes: 3/8 to 5/8 inch nominal.

15  
16 Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

17  
18 Products:

19  
20 Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.  
21 Euclid Chemical Company (The); Kurez DR VOX.  
22 Kaufman Products, Inc.; Thinfilm 420.  
23 L&M Construction Chemicals, Inc.; L&M Cure R.  
24 Meadows, W. R., Inc.; 1100 Clear.

25  
26 Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete  
27 surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to  
28 1/4 inch.

29 Products:

30  
31 Conspec Marketing & Manufacturing Co., Inc.; Delay S.  
32 Euclid Chemical Company (The); Surface Retarder S.  
33 Kaufman Products, Inc.; Expose.  
34 Scofield, L. M. Company; Lithotex.  
35 Sika Corporation, Inc.; Rugasol-S.

36  
37 Pigmented Mineral Dry-Shake Hardener: Factory-packaged dry combination of portland cement,  
38 graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are  
39 finely ground, non-fading mineral oxides inter-ground with cement.

40  
41 Products:

42  
43 Conspec Marketing & Manufacturing Co., Inc.; Conshake 600 Colortone.  
44 Metalcrete Industries; Floor Quartz.  
45 Scofield, L. M. Company; Lithochrome Color Hardener.  
46 Symons Corporation; Hard Top.

47  
48 Color: **As selected by Architect from manufacturer's full range**

49  
50 **EXPOSED-AGGREGATE FINISH**

51  
52 Immediately after initial floating, spread a single layer of aggregate uniformly on pavement surface.  
53 Tamp aggregate into plastic concrete, and float finish to entirely embed aggregate with mortar cover  
54 of 1/16 inch.

55  
56 Spray-apply chemical surface retarder to pavement according to manufacturer's written  
57 instructions.

- 1 Cover pavement surface with plastic sheeting, sealing laps with tape, and remove sheeting  
2 when ready to continue finishing operations.  
3
- 4 Without dislodging aggregate, remove excess mortar by lightly brushing surface with a stiff,  
5 nylon-bristle broom.  
6
- 7 Fine-spray surface with water and brush. Repeat water flushing and brushing cycle until  
8 cement film is removed from aggregate surfaces to depth required.  
9
- 10 PIGMENTED MINERAL DRY-SHAKE HARDENER FINISH
- 11
- 12 After initial floating, apply dry-shake materials to pavement surface according to manufacturer's  
13 written instructions and as follows:  
14
- 15 Uniformly spread dry-shake hardener at a rate of 100 lb/100 sq. ft., unless greater amount is  
16 recommended by manufacturer to match pavement color required.  
17
- 18 Uniformly distribute approximately two-thirds of dry-shake hardener over pavement surface with  
19 mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating  
20 with a second dry-shake hardener application, uniformly distributing remainder of material at right  
21 angles to first application to ensure uniform color, and embed by power floating.  
22
- 23 After final floating, apply a hand-trowel finish followed by a broom finish to concrete.  
24
- 25 Cure concrete with clear curing compound recommended by dry-shake hardener manufacturer.  
26 Apply curing compound immediately after final finishing.  
27  
28
- 29 END OF APPENDIX

1 **SECTION 32 13 13 - CONCRETE PAVING**

2  
3  
4 **PART 1 - GENERAL**

5  
6 RELATED DOCUMENTS

7  
8 Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9 and Division 01 Specification Sections, apply to this Section.

10  
11 SUMMARY

12  
13 Exterior cement concrete pavement including:

14  
15 Walkways  
16 Curbs and gutters

17  
18 Related Sections include:

19  
20 Division 03 Section "Cast-in-Place Concrete" for concrete materials and mix requirements.  
21 Division 32 Section "Earth Moving" for sub-grade preparation, grading and sub-base course

22  
23 SUBMITTALS

24  
25 Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when  
26 characteristics of materials, Project conditions, weather, test results, or other circumstances warrant  
27 adjustments.

28  
29 Field quality-control test reports.

30  
31 QUALITY ASSURANCE

32  
33 Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with  
34 ASTM C 94/C 94M requirements for production facilities and equipment.

35  
36 Testing Agency Qualifications: An agency qualified according to ASTM C 1077 and ASTM E 329 for  
37 testing indicated, as documented according to ASTM E 548.

38  
39 ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by  
40 requirements in the Contract Documents.

41  
42  
43 **PART 2 - PRODUCTS**

44  
45 FORMS

46  
47 Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to  
48 provide full-depth, continuous, straight, smooth exposed surfaces.

49  
50 Use flexible or curved forms for curves with a radius 100 feet or less.

51  
52 Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or  
53 adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

54  
55 STEEL REINFORCEMENT

56  
57 Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat  
58 sheets.

- 1  
2 Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.  
3  
4 Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with  
5 ends square and free of burrs.  
6  
7 Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening  
8 reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports  
9 according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of  
10 greater compressive strength than concrete, and as follows:

11  
12 CURING MATERIALS

- 13  
14 Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to  
15 fresh concrete.

16  
17 Products:

- 18  
19 Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.  
20 Euclid Chemical Company (The); Eucobar.  
21 Kaufman Products, Inc.; Vapor Aid.  
22 L&M Construction Chemicals, Inc.; E-Con.  
23 Meadows, W. R., Inc.; Sealtight Evapre.  
24 Sika Corporation, Inc.; SikaFilm.

- 25  
26 White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

27  
28 Products:

- 29  
30 Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.  
31 Euclid Chemical Company (The); Kurez VOX White Pigmented.  
32 Kaufman Products, Inc.; Thinfilm 450.  
33 L&M Construction Chemicals, Inc.; L&M Cure R-2.  
34 Meadows, W. R., Inc.; 1200-White.

35  
36 RELATED MATERIALS

- 37  
38 Expansion-Joint and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or  
39 ASTM D 1752, cork or self-expanding cork.

- 40  
41 Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- 42  
43 Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and  
44 bonding to damp surfaces, of class suitable for application temperature and of grade to  
45 requirements, and as follows:

- 46  
47 Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to  
48 hardened concrete.

- 49  
50 Detectable Warning Surfaces: Tactile pattern of raised, truncated domes complying with  
51 ANSI A117.1 (705.3.1).

52  
53 Available Manufacturers:

54  
55 Pre-Cast Concrete Pavers

- 56  
57 Mutual Materials  
58 Tile Tech Pavers

1  
2  
3  
4  
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58

Vitrified Polymer Composite Panels

ADA Solutions Inc.  
Armor-Tile

## CONCRETE MIXTURES

Engage a qualified testing agency to design concrete mixtures.

Ready-Mixed Concrete: Refer to Division 3 Section "Cast-in-Place Concrete."

Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.

For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

For concrete mixes larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..

Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## PART 3 - EXECUTION

### EXAMINATION

Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading and elevation tolerances.

Proof-roll prepared subbase surface below concrete pavements to identify soft pockets and areas of excess yielding.

Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch require correction according to requirements in Division 2 Section "Earthwork."

Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

### PREPARATION

Remove loose material from compacted subbase surface immediately before placing concrete.

### EDGE FORMS AND SCREED CONSTRUCTION

Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

## 1 STEEL REINFORCEMENT

2

3 Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting  
4 reinforcement.

5

6 Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

7

8 Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one  
9 full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in  
10 either direction.

11

## 12 JOINTS

13

14 General: Form construction, isolation, and contraction joints and tool edgings true to line with faces  
15 perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline,  
16 unless otherwise indicated.

17

18 When joining existing pavement, place transverse joints to align with previously placed  
19 joints, unless otherwise indicated.

20

21 Construction Joints: Provide construction joints at side and end terminations of pavement and at  
22 locations where pavement operations are stopped for more than one-half hour unless pavement  
23 terminates at isolation joints.

24

25 Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless  
26 otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

27

28 Isolation and Expansion Joints: Form joints using preformed joint-filler strips.

29

30 Provide isolation joints abutting concrete curbs, catch basins, manholes, inlets,  
31 structures, walks, other fixed objects, and where indicated.

32

33 Provide expansion joints at minimum intervals of 50 feet, unless otherwise indicated  
34 on Drawings.

35

36 Extend joint fillers full width and depth of joint.

37

38 Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint  
39 sealant is indicated.

40

41 Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.

42

43 Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or  
44 clip joint-filler sections together.

45

46 Protect top edge of joint filler during concrete placement with metal, plastic, or other  
47 temporary preformed cap. Remove protective cap after concrete has been placed on both  
48 sides of joint.

49

50 Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as  
51 indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete  
52 thickness, as follows.

53

54 Grooved Joints: Form contraction joints after initial floating by grooving and finishing each  
55 edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints  
56 after applying surface finishes. Eliminate groover marks on concrete surfaces.

57

1 Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an  
2 edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate  
3 tool marks on concrete surfaces.

4

#### 5 CONCRETE PLACEMENT

6

7 Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement,  
8 and items to be embedded or cast in. Notify other trades to permit installation of their work.

9

10 Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not  
11 place concrete on frozen surfaces.

12

13 Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place  
14 concrete around manholes or other structures until they are at required finish elevation and  
15 alignment.

16

17 Comply with ACI 301 requirements for transporting and placing concrete.

18

19 Do not add water to concrete during delivery or at Project site.

20

21 Deposit and spread concrete in a continuous operation between transverse joints. Do not push or  
22 drag concrete into place or use vibrators to move concrete into place.

23

24 Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by  
25 hand spading, rodding, or tamping.

26

27 Consolidate concrete along face of forms and adjacent to transverse joints with an internal  
28 vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only  
29 square-faced shovels for hand spreading and consolidation. Consolidate with care to  
30 prevent dislocating reinforcement, dowels, and joint devices.

31

32 Screed pavement surfaces with a straightedge and strike off.

33

34 Commence initial floating using bull floats or darbies to impart an open textured and uniform surface  
35 plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete  
36 surfaces before beginning finishing operations or spreading surface treatments.

37

38 Curbs and Gutters: When automatic machine placement is used for curb and gutter placement,  
39 submit revised mix design and laboratory test results that meet or exceed requirements. Produce  
40 curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed  
41 concrete. If results are not approved, remove and replace with formed concrete.

42

43 Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from  
44 physical damage or reduced strength that could be caused by frost, freezing actions, or low  
45 temperatures.

46

47 When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat  
48 water and aggregates before mixing to obtain a concrete mixture temperature of not less  
49 than 50 deg F and not more than 80 deg F at point of placement.

50

51 Do not use frozen materials or materials containing ice or snow.

52

53 Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical  
54 accelerators unless otherwise specified and approved in mix designs.

55

56 Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

57

1 Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of  
2 placement. Chilled mixing water or chopped ice may be used to control temperature,  
3 provided water equivalent of ice is calculated to total amount of mixing water. Using liquid  
4 nitrogen to cool concrete is Contractor's option.

5  
6 Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed  
7 ambient air temperature immediately before embedding in concrete.

8  
9 Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep  
10 subgrade moisture uniform without standing water, soft spots, or dry areas.

11  
12 **FINISHING**

13  
14 General: Do not add water to concrete surfaces during finishing operations.

15  
16 Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and  
17 concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven  
18 floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true  
19 planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular  
20 texture.

21  
22 Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line  
23 of traffic to provide a uniform, fine-line texture.

24  
25 Detectable Warning Surfaces: At curb cuts and other locations indicated or required by code,  
26 provide stamped cast-in-place concrete, pre-cast concrete pavers or cast-in vitrified polymer  
27 composite panels complying with ANSI A117.1 (705.3.1).

28  
29 **CONCRETE PROTECTION AND CURING**

30  
31 General: Protect freshly placed concrete from premature drying and excessive cold or hot  
32 temperatures.

33  
34 Comply with ACI 306.1 for cold-weather protection.

35  
36 Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy  
37 conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations.  
38 Apply according to manufacturer's written instructions after placing, screeding, and bull floating or  
39 darbying concrete, but before float finishing.

40  
41 Curing Compound: Begin curing after finishing concrete but not before free water has disappeared  
42 from concrete surface.

43  
44 Apply uniformly in continuous operation by power spray or roller according to manufacturer's  
45 written instructions. Recoat areas subjected to heavy rainfall within three hours after initial  
46 application. Maintain continuity of coating and repair damage during curing period.

47  
48 **PAVEMENT TOLERANCES**

49  
50 Comply with tolerances of ACI 117 and as follows:

51  
52 Elevation: 1/4 inch.

53 Thickness: Plus 3/8 inch, minus 1/4 inch.

54 Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.

55 Joint Spacing: 3 inches.

56 Contraction Joint Depth: Plus 1/4 inch, no minus.

57 Joint Width: Plus 1/8 inch, no minus.

58

## 1 FIELD QUALITY CONTROL

2

3 Testing Frequency: Obtain at least 1 composite sample per ASTM C 172 for each 5000 sq. ft. or  
4 fraction thereof of each concrete mix placed each day.

5

6 When frequency of testing will provide fewer than five compressive-strength tests for each  
7 concrete mixture, testing shall be conducted from at least five randomly selected batches or  
8 from each batch if fewer than five are used.

9

10 Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not  
11 less than one test for each day's pour of each concrete mix. Perform additional tests when concrete  
12 consistency appears to change.

13

14 Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than  
15 one test for each day's pour of each concrete mix.

16

17 Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below  
18 and when 80 deg F and above, and one test for each composite sample.

19

20 Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard  
21 cylinder specimens for each composite sample.

22

23 Compressive-Strength Tests: ASTM C 39; test 1 specimen at 7 days and 2 specimens at 28 days.

24

25 A compressive-strength test shall be the average compressive strength from 2 specimens  
26 obtained from same composite sample and tested at 28 days.

27

28 Strength of each concrete mix will be satisfactory if average of any 3 consecutive  
29 compressive-strength tests equals or exceeds specified compressive strength and no  
30 compressive-strength test value falls below specified compressive strength by more than  
31 500 psi.

32

33 Test results will be reported in writing to Architect, concrete manufacturer, and Contractor within 48  
34 hours of testing. Reports of compressive-strength tests shall contain Project identification name and  
35 number, date of concrete placement, name of concrete testing and inspecting agency, location of  
36 concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and  
37 materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

38

39 Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be  
40 permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

41

42 Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test  
43 results indicate that slump, air entrainment, compressive strengths, or other requirements have not  
44 been met, as directed by Architect.

45

46 Remove and replace concrete pavement where test results indicate that it does not comply with  
47 specified requirements.

48

49 Additional testing and inspecting, at Contractor's expense, will be performed to determine  
50 compliance of replaced or additional work with specified requirements.

51

## 52 REPAIRS AND PROTECTION

53

54 Remove and replace concrete pavement that is broken, damaged, or defective or that does not  
55 comply with requirements in this Section.

56

- 1 Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or
- 2 defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete
- 3 bonded to pavement with epoxy adhesive.
- 4
- 5 Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement.
- 6 When construction traffic is permitted, maintain pavement as clean as possible by removing surface
- 7 stains and spillage of materials as they occur.
- 8
- 9 Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep
- 10 concrete pavement not more than two days before date scheduled for Substantial Completion
- 11 inspections.
- 12
- 13
- 14 END OF SECTION
- 15
- 16

1     **SECTION 32 60 00 – ORNAMENTAL PICKET FENCES**

2  
3  
4     **PART 1 - GENERAL**

5  
6     Scope: All labor, material, equipment, and related services to furnish and install fencing as shown  
7     on the Drawings.

8  
9     **REFERENCE STANDARDS**

10  
11     ASTM A653 / A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-  
12     Iron Alloy Coated (Galvannealed) by the Hot-Dip Process

13  
14     ASTM B117 – Practice for Operating Salt-Spray (Fog) Apparatus

15  
16     ASTM D523 – Test Method for Specular Gloss

17  
18     ASTM D822 – Practice for Conducting Tests on Paint and Related Coating and Materials using  
19     Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus

20  
21     ASTM D1654 – Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive  
22     environments

23  
24     ASTM D2244 – Test Method for Calculation of Color Differences from Instrumentally Measured Color  
25     Coordinates

26  
27     ASTM D2794 – Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation  
28     (Impact)

29  
30     ASTM D3359 – Test Method for Measuring Adhesion by Tape Test

31  
32     **SUBMITTALS**

33  
34     Shop Drawings: Layout of fences and gates with dimensions, details, and finishes of components,  
35     accessories, and post foundations.

36  
37     Product Data: Manufacturer's catalog cuts indicating material compliance and specified options.

38  
39     Sample: Color selection for polymer finishes. If requested, samples of materials (e.g., finials, caps,  
40     and accessories).

41  
42     **QUALITY ASSURANCE**

43  
44     Installer Qualifications: Engage and experienced installer who has at least three years experience  
45     and has completed at least five steel fence projects with same material and of similar scope to that  
46     indicated for this project with a successful construction record in-service performance.

47  
48     Single-Source Responsibility: Obtain steel fences and gates, including accessories, fittings, and  
49     fastenings, from a single source.

50  
51     **PROJECT CONDITIONS**

52  
53     Field measurements: Verify layout information for fences and gates shown on the Drawings in  
54     relation to the property survey and existing structures. Verify dimensions by field measurements.

## 1 WARRANTY

2

3 Manufacturer's warranty: Two years – installation; ten years – materials and finishes.

4

## 5 PRODUCT HANDING AND STORAGE

6

7 Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during  
8 shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and  
9 drainage, and to protect against damage, weather, vandalism, and theft.

10

11

12 **PART 2 - PRODUCTS**

13

## 14 STEEL PRODUCTS

15

16 Recycled Content of Steel Products: Provide products with an average recycled content of steel  
17 products so postconsumer recycled content plus one-half of pre-consumer recycled content is not  
18 less than 20 percent.

19

## 20 FENCE MATERIALS

21

22 General: Provide steel fence materials as manufactured by "Qualline Fence Corp" or approved  
23 equal. Review existing conditions.

24

25 Galvanized steel sheet conforming to requirements of ASTM A653, G90 designation.

26

27 Tensile strength – 58,000 psi (400 Mpa) minimum.

28

29 Yield strength – 50,000 psi (344 Pa) minimum.

30

31 Color: black.

32

33 Height: as noted on detail with 6" concave sweep down at center of panel. Minimum height above  
34 adjacent grade will be 7'-0". Field verify existing conditions.

35

36 Color: black powder-coated.

37

38 Pickets: 3/4" x 3/4" x 16 ga. ASTM 787 steel, pressed top.

39

40 Picket spacing: 3-15/16".

41

42 Rails: 1-1/2" x 1-1/2" x 14 ga. ASTM A787 steel – two rails.

43

44

45 Posts: 2-1/2" x 2-1/2" x 12 ga. sleeves over 2-1/2" Sch. 20 round posts.

46

47 Post caps: formed steel.

48

49 Coating: multi-stage pre-treatment / wash (with zinc phosphate) Zinc-rich Epoxy Primer; glossy  
50 polyester TGIC power top coat finish.

51

## 52 CONCRETE

53

54 Provide concrete consisting of portland cement per ASTM C150, aggregates per ASTM C33, and  
55 potable water. Mix materials to obtain concrete with a minimum 28-day compressive strength of  
56 3000 PSI.

57

58

## 1 KEYLOCK

2

3 Key lock shall be Lok-Latch Pro manufactured by D &amp; D Technologies or Owner-approved equal.

4

## 5 GATE HINGES

6

7 Gate hinges shall be Trie-Close adjustable gate hinges by D & D Technologies or Owner-approved  
8 equal.

9

10 **PART 3 – EXECUTION**

11

12 **INSTALLATION – GENERAL**

13

14 Install fence in compliance with manufacturers written instructions. During installation components  
15 shall be carefully handled and stored to avoid contact with abrasive surfaces. Install components in  
16 sequence as recommended by fence manufacturer.

17

18 **FENCE INSTALLATION**

19

20 **EXCAVATION:** Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm,  
21 undisturbed or compacted soil. If note indicated on Drawings, excavate holes for each post to a  
22 minimum depth of 36".

23

24 **POSTS:** Install posts in one piece, plumb and in line. Space as detailed. Enlarge excavation as  
25 required to provide clearance indicated between post and side of excavation.

26

27 1. Protect portion of posts above ground from concrete splatter. Place concrete  
28 around posts and vibrate or tamp for consolidation. Check each post for vertical and  
29 top alignment and hold in position during placement and finishing operations.

30

31 Unless otherwise indicated, terminate top of concrete footing 3" below adjacent  
32 grade and trowel to a crown to shed water.

33

34 **FABRICATION**

35

36 Pickets, rails, and posts shall be pre-cut to specified lengths. ForeRunner™ rails shall be pre-  
37 punched to accept pickets.

38

39 Grommets shall be inserted into the pre-punched holes in the rails and pickets shall be inserted  
40 through the grommets so that pre-drilled picket holes align with the internal upper raceway of the  
41 ForeRunner™ rails. (Note: This can best be accomplished by using an alignment template.)  
42 Retaining rods shall be inserted into each ForeRunner™ rail so that they pass through the pre-drilled  
43 holes in each picket, thus completing the panel assembly.

44

45 Completely panels shall be capable of supporting a 400 lb. load (applied at mid-span) without  
46 permanent deformation. Panels without rings shall be bias able to a 25% change in grade; panels  
47 with rings shall be bias able to a 12.5% change in grade.

48

49 Swing gates shall be fabricated in a manner similar to panels with security hardware. Gates may be  
50 single or double door.

51

52 **GATE INSTALLATION**

53

54 Assemble gate prior to fence installation to accurately locate hinge and latch post. Align gate  
55 horizontal rails with fence horizontal rails.

56

57 Install gates plumb, level, and secure for full opening without interference according to  
58 manufacturer's instructions.

- 1
- 2 Provide gates with specified key locks and hinges. Adjust gates for smooth, trouble-free operation.
- 3
- 4 ADJUSTING AND CLEANING
- 5
- 6 Remove all traces of dirt and soiled areas.
- 7
- 8 DEMONSTRATION
- 9
- 10 Instruct the owner's personnel on proper operation and maintenance of fence components.
- 11
- 12       Employ an arborist, licensed in jurisdiction where Project is located, to submit details of
- 13       proposed repairs and to repair damage to trees and shrubs.
- 14
- 15       Replace trees that cannot be repaired and restored to full-growth status.
- 16
- 17
- 18 END OF SECTION

1     **SECTION 32 91 13 – SOIL PREPARATION**

2  
3  
4     **PART 1 - GENERAL**

5  
6     **RELATED DOCUMENTS**

7  
8     Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9     and Division 01 Specification Sections, apply to this Section.

10  
11    **SUMMARY**

12  
13    Section includes planting soils and layered soil assemblies specified by composition of the mixes.  
14    Related Requirements:

- 15  
16            Section 311000 "Site Clearing" for topsoil stripping and stockpiling.  
17            Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.  
18            Section 329300 "Plants" for placing planting soil for plantings.  
19            Section 329600 "Transplanting" for placing planting soil in tree planting pits.

20  
21    **DEFINITIONS**

22  
23    AAPFCO: Association of American Plant Food Control Officials.

24  
25    Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be  
26    amended or unamended soil as indicated.

27  
28    CEC: Cation exchange capacity.

29  
30    Compost: The product resulting from the controlled biological decomposition of organic material that  
31    has been sanitized through the generation of heat and stabilized to the point that it is beneficial to  
32    plant growth.

33  
34    Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed  
35    leaves, twigs, and detritus.

36  
37    Imported Soil: Soil that is transported to Project site for use.

38  
39    Layered Soil Assembly: A designed series of planting soils, layered on each other, that together  
40    produce an environment for plant growth.

41  
42    Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and  
43    other materials to produce planting soil.

44  
45    NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and  
46    water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of  
47    analytical data.

48  
49    Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal  
50    tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil  
51    organic matter."

52  
53    Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as  
54    specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant  
55    growth.

56  
57    RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and  
58    Recovery Act.

- 1  
2 SSSA: Soil Science Society of America.  
3  
4 Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface  
5 of a fill or backfill before planting soil is placed.  
6  
7 Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring  
8 soil profile, typified by less than 1 percent organic matter and few soil organisms.  
9  
10 Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas,  
11 surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the  
12 surface soil can be subsoil.  
13  
14 USCC: U.S. Composting Council.  
15  
16 PREINSTALLATION MEETINGS  
17  
18 Preinstallation Conference: Conduct conference at Project site.  
19  
20 ACTION SUBMITTALS  
21  
22 Product Data: For each type of product.  
23  
24       Include recommendations for application and use.  
25  
26       Include test data substantiating that products comply with requirements.  
27  
28       Include sieve analyses for aggregate materials.  
29  
30       Material Certificates: For each type of imported soil and soil amendment and fertilizer before  
31 delivery to the site, according to the following:  
32  
33               Manufacturer's qualified testing agency's certified analysis of standard products.  
34  
35               Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO  
36 methods for testing and labeling and according to AAPFCO's SUIP #25.  
37  
38               Analysis of nonstandard materials, by a qualified testing agency, made according to  
39 SSSA methods, where applicable.  
40  
41 LEED Submittals: None  
42  
43 Samples: For each bulk-supplied material, 1-quart (1-L) volume of each in sealed containers labeled  
44 with content, source, and date obtained. Each Sample shall be typical of the lot of material to be  
45 furnished; provide an accurate representation of composition, color, and texture.  
46  
47 INFORMATIONAL SUBMITTALS  
48  
49 Qualification Data: For each testing agency.  
50  
51 Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction  
52 Testing" Article.  
53  
54 Field quality-control reports.  
55  
56  
57  
58

1 QUALITY ASSURANCE

2  
3 Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory;  
4 experienced in soil science, soil testing, and plant nutrition; with the experience and capability to  
5 conduct the testing indicated; and that specializes in types of tests to be performed.

6  
7 Multiple Laboratories: At Contractor's option, work may be divided among qualified testing  
8 laboratories specializing in physical testing, chemical testing, and fertility testing.

9  
10 PRECONSTRUCTION TESTING

11  
12 Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil  
13 analyses on existing, on-site soil and imported soil.

14  
15 Notify Architect seven days in advance of the dates and times when laboratory samples will  
16 be taken.

17  
18 Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and  
19 furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations  
20 by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and  
21 "Testing Requirements" articles.

22  
23 Have testing agency identify and label samples and test reports according to sample  
24 collection and labeling requirements.

25  
26 SOIL-SAMPLING REQUIREMENTS

27  
28 General: Extract soil samples according to requirements in this article.

29  
30 Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of  
31 Architect under the direction of the testing agency.

32  
33 Number and Location of Samples: Minimum of three representative soil samples from varied  
34 locations for each soil to be used or amended for landscaping purposes.

35  
36 Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing  
37 and Sampling Soils."

38  
39 Division of Samples: Split each sample into two, equal parts. Send half to the testing agency  
40 and half to Owner for its records.

41  
42 Labeling: Label each sample with the date, location keyed to a site plan or other location  
43 system, visible soil condition, and sampling depth.

44  
45 TESTING REQUIREMENTS

46  
47 General: Perform tests on soil samples according to requirements in this article.

48  
49 Physical Testing:

50  
51 Soil Texture: Soil-particle, size-distribution analysis by one of the following methods  
52 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical  
53 Methods":

54  
55 Sieving Method: Report sand-gradation percentages for very coarse, coarse,  
56 medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for  
57 fine, medium, and coarse fragments; according to USDA sand and fragment sizes.

- 1 Hydrometer Method: Report percentages of sand, silt, and clay.  
2  
3 Total Porosity: Calculate using particle density and bulk density according to SSSA's  
4 "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."  
5  
6 Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and  
7 Mineralogical Methods."  
8  
9 Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-  
10 Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698  
11 (Standard Proctor).  
12  
13 Chemical Testing:  
14  
15 CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis -  
16 Part 3- Chemical Methods."  
17  
18 Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC  
19 by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-  
20 Physical and Mineralogical Methods."  
21  
22 Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals  
23 including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and  
24 vanadium. If RCRA metals are present, include recommendations for corrective action.  
25  
26 Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including  
27 aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium,  
28 mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.  
29  
30 Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NCR-  
31 13 including the following:  
32  
33 Percentage of organic matter.  
34 CEC, calcium percent of CEC, and magnesium percent of CEC.  
35 Soil reaction (acidity/alkalinity pH value).  
36 Buffered acidity or alkalinity.  
37 Nitrogen ppm.  
38 Phosphorous ppm.  
39 Potassium ppm.  
40 Manganese ppm.  
41 Manganese-availability ppm.  
42 Zinc ppm.  
43 Zinc availability ppm.  
44 Copper ppm.  
45 Sodium ppm and sodium absorption ratio.  
46 Soluble-salts ppm.  
47 Presence and quantities of problem materials including salts and metals cited in the  
48 Standard protocol. If such problem materials are present, provide additional  
49 recommendations for corrective action.  
50 Other deleterious materials, including their characteristics and content of each.  
51  
52 Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of  
53 Soil Analysis - Part 3- Chemical Methods."  
54  
55 Recommendations: Based on the test results, state recommendations for soil treatments and soil  
56 amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable  
57 plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium  
58 fertilization, and for micronutrients.

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Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. (100 sq. m) for 6-inch (150-mm)depth of soil.

Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. (100 sq. m) for 6-inch (150-mm)depth of soil.

#### DELIVERY, STORAGE, AND HANDLING

Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

#### Bulk Materials:

Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

Do not move or handle materials when they are wet or frozen.

Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

## PART 2 - PRODUCTS

### MATERIALS

Regional Materials: Imported soil, manufactured planting soil and soil amendments and fertilizers shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

### PLANTING SOILS SPECIFIED BY COMPOSITION

General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

Planting-Soil Type Existing, on-site surface topsoil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Blend existing, on-site surface soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

Ratio of Loose Compost to Soil: 1:4 by volume.

Weight of Slow-Release Fertilizer: 1000 sq. ft. (100 sq. m) 6 inches (150 mm) of soil depth.

Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of loam or silt loam soil according to USDA textures; and modified to produce viable planting soil.

Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches (100 mm) deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens;

1 or obnoxious weeds and invasive plants including, but not limited to, quackgrass,  
2 Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild  
3 garlic, ground ivy, perennial sorrel, and bromegrass.

4  
5 Additional Properties of Imported Soil before Amending: Soil reaction of pH 6 to 7 and  
6 minimum of 6 percent organic-matter content, friable, and with sufficient structure to give  
7 good tilth and aeration.

8  
9 Unacceptable Properties: Clean soil of the following:

10  
11 Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster,  
12 building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing  
13 compound, acid, and other extraneous materials that are harmful to plant growth.

14  
15 Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse  
16 sand that exceed a combined maximum of 8 percent by dry weight of the imported  
17 soil.

18  
19 Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand  
20 exceeding 2 inches (50 mm) in any dimension.

21  
22 Amended Soil Composition: Blend imported, unamended soil with the following soil  
23 amendments and fertilizers in the following quantities to produce planting soil:

24  
25 Ratio of Loose Compost to Soil: 1:4 by volume.

26  
27 Weight of Slow-Release Fertilizer: per 1000 sq. ft. (100 sq. m) per 6 inches (150  
28 mm) of soil depth.

#### 29 30 INORGANIC SOIL AMENDMENTS

31  
32 Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium  
33 carbonate equivalent and as follows:

34  
35 Class: T, with a minimum of 99 percent passing through a No. 8 (2.36-mm) sieve and a  
36 minimum of 75 percent passing through a No. 60 (0.25-mm) sieve.

37  
38 Class: O, with a minimum of 95 percent passing through a No. 8 (2.36-mm) sieve and a  
39 minimum of 55 percent passing through a No. 60 (0.25-mm) sieve.

40  
41 Form: Provide lime in form of ground dolomitic limestone or calcitic limestone

42  
43 Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a  
44 minimum of 99 percent passing through a No. 6 (3.35-mm) sieve and a maximum of 10 percent  
45 passing through a No. 40 (0.425-mm) sieve.

46  
47 Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent  
48 sulfur.

49  
50 Perlite: Horticultural perlite, soil amendment grade.

51  
52 Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing  
53 through a No. 50 (0.30-mm) sieve.

54  
55 Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to  
56 ASTM C 33/C 33M.

57  
58

1    **ORGANIC SOIL AMENDMENTS**

2

3    Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock,  
4    and bearing USCC's "Seal of Testing Assurance," and as follows:

5

6            Reaction: pH of 5.5 to 8.

7            Soluble-Salt Concentration: Less than 4 dS/m.

8            Moisture Content: 35 to 55 percent by weight.

9            Organic-Matter Content: 50 to 60 percent of dry weight.

10           Particle Size: Minimum of 98 percent passing through a 1-inch (25-mm) sieve.

11

12    **FERTILIZERS**

13

14    Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble  
15    nitrogen, phosphorus, and potassium in the following composition:

16

17            Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by  
18            weight.

19

20            Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil  
21            reports from a qualified testing agency.

22

23

24    **PART 3 - EXECUTION**

25

26    **GENERAL**

27

28    Place planting soil and fertilizers according to requirements in other Specification Sections.

29

30    Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry,  
31    concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar,  
32    roofing compound, or acid has been deposited in planting soil.

33

34    Proceed with placement only after unsatisfactory conditions have been corrected.

35

36    **PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING**

37

38    Excavation: Excavate soil from designated area(s) to a depth of 6 inches (150 mm) and stockpile  
39    until amended.

40

41    Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster,  
42    building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and  
43    other extraneous materials that are harmful to plant growth.

44

45    Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots,  
46    plants, sod, clay lumps, and pockets of coarse sand.

47

48    Screening: Pass unamended soil through a 2-inch (50-mm) sieve to remove large materials.

49

50    **PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE**

51

52    General: Apply and mix unamended soil with amendments on-site to produce required planting soil.  
53    Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

54

55    Subgrade Preparation: Till subgrade to a minimum depth of 8 inches (200 mm). Remove stones  
56    larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish, and other extraneous  
57    matter and legally dispose of them off Owner's property.

58

1 Apply, add soil amendments, and mix approximately half the thickness of unamended soil  
2 over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly  
3 into top 4 inches (100 mm) of subgrade. Spread remainder of planting soil.  
4

5 Mixing: Spread unamended soil to total depth of 8 inches (200 mm), but not less than required to  
6 meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or  
7 subgrade is frozen, muddy, or excessively wet.  
8

9 Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and  
10 thoroughly blend them with unamended soil to produce planting soil.  
11

12 Mix fertilizer with planting soil no more than seven days before planting.  
13

14 Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches (200  
15 mm) in loose depth for material compacted by compaction equipment, and not more than 4  
16 inches (100 mm) in loose depth for material compacted by hand-operated tampers.  
17

18 Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard  
19 Proctor density according to ASTM D 698 and tested in-place.  
20

21 Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine  
22 texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.  
23

#### 24 BLENDING PLANTING SOIL IN PLACE

25

26 General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not  
27 apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.  
28

29 Preparation: Till unamended, existing soil in planting areas to a minimum depth of 8 inches (200  
30 mm). Remove stones larger than 1-1/2 inches (38 mm) in any dimension and sticks, roots, rubbish,  
31 and other extraneous matter and legally dispose of them off Owner's property.  
32

33 Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend  
34 them into full depth of unamended, in-place soil to produce planting soil.  
35

36 Mix fertilizer with planting soil no more than seven days before planting.  
37

38 Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor  
39 density according to ASTM D 698.  
40

41 Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine  
42 texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.  
43

#### 44 FIELD QUALITY CONTROL

45

46 Testing Agency: Engage a qualified testing agency to perform tests and inspections.  
47

48 Perform the following tests:  
49

50 Compaction: Test planting-soil compaction after placing each lift and at completion using a  
51 densitometer or soil-compaction meter calibrated to a reference test value based on  
52 laboratory testing according to ASTM D 698. Space tests at no less than one for each 1000  
53 sq. ft. (100 sq. m) of in-place soil or part thereof.  
54

55 Soil will be considered defective if it does not pass tests.  
56

57 Prepare test reports.  
58

1 Label each sample and test report with the date, location keyed to a site plan or other location  
2 system, visible conditions when and where sample was taken, and sampling depth.

3

4 PROTECTION

5

6 Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant  
7 Protection."

8

9 Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit  
10 the following practices within these areas except as required to perform planting operations:

11

12 Storage of construction materials, debris, or excavated material.

13 Parking vehicles or equipment.

14 Vehicle traffic.

15 Foot traffic.

16 Erection of sheds or structures.

17 Impoundment of water.

18 Excavation or other digging unless otherwise indicated.

19

20 If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious  
21 materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by  
22 Architect and replace contaminated planting soil with new planting soil.

23

24 CLEANING

25

26 Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep  
27 adjacent paving and construction clean and work area in an orderly condition.

28

29 Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and  
30 debris and legally dispose of them off Owner's property unless otherwise indicated.

31

32 Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

33

34

35 END OF SECTION

1    **SECTION 32 92 00 – TURF AND GRASSES**

2

3

4    **PART 1 - GENERAL**

5

6    **RELATED DOCUMENTS**

7

8    Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9    and Division 01 Specification Sections, apply to this Section.

10

11   **SUMMARY**

12

13    Section Includes:

14

15        Turf renovation.

16

17    Related Requirements:

18

19        Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border  
20        edgings and mow strips.

21

22    **DEFINITIONS**

23

24    Finish Grade: Elevation of finished surface of planting soil.

25

26    Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest.  
27    Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides.  
28    They also includes substances or mixtures intended for use as a plant regulator, defoliant, or  
29    desiccant.

30

31    Pests: Living organisms that occur where they are not desired or that cause damage to plants,  
32    animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents  
33    (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

34

35    Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with  
36    soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See  
37    Section 329113 "Soil Preparation" and drawing designations for planting soils.

38

39    Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top  
40    surface of a fill or backfill before planting soil is placed.

41

42    **INFORMATIONAL SUBMITTALS**

43

44    Qualification Data: For landscape Installer.

45

46    Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture, stating  
47    the botanical and common name, percentage by weight of each species and variety, and percentage  
48    of purity, germination, and weed seed. Include the year of production and date of packaging.

49

50    Product Certificates: For fertilizers, from manufacturer.

51

52    Pesticides and Herbicides: Product label and manufacturer's application instructions specific to  
53    Project.

54

55    **QUALITY ASSURANCE**

56

57    Installer Qualifications: A qualified landscape installer whose work has resulted in successful turf  
58    establishment.

- 1  
2 Professional Membership: Installer shall be a member in good standing of either the  
3 American Nursery and Landscape Association.  
4  
5 Experience: Three years' experience in turf installation in addition to requirements in  
6 Section 014000 "Quality Requirements."  
7  
8 Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor  
9 on Project site when work is in progress.  
10  
11 Pesticide Applicator: State licensed, commercial.

#### 12 DELIVERY, STORAGE, AND HANDLING

- 13  
14  
15 Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers  
16 showing weight, certified analysis, name and address of manufacturer, and indication of compliance  
17 with state and Federal laws, as applicable.  
18  
19 Bulk Materials:  
20  
21 Do not dump or store bulk materials near structures, utilities, walkways and pavements, or  
22 on existing turf areas or plants.  
23  
24 Provide erosion-control measures to prevent erosion or displacement of bulk materials;  
25 discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water  
26 conveyance systems, or walkways.  
27  
28 Accompany each delivery of bulk materials with appropriate certificates.

#### 29 FIELD CONDITIONS

- 30  
31  
32 Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with  
33 initial maintenance periods to provide required maintenance from date of planting completion.  
34  
35 Spring Planting: May 1 – June 15.  
36 Fall Planting: September 1 – October 15.  
37  
38 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions  
39 permit planting to be performed when beneficial and optimum results may be obtained. Apply  
40 products during favorable weather conditions according to manufacturer's written instructions.  
41

### 42 PART 2 - PRODUCTS

#### 43 SEED

- 44  
45  
46 Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for  
47 purity and germination tolerances.  
48  
49 Seed Species:  
50  
51  
52 Quality: State-certified seed of grass species as listed below for solar exposure.  
53  
54 Quality: Seed of grass species as listed below for solar exposure, with not less than 85  
55 percent germination, not less than 95 percent pure seed, and not more than 0.5 percent  
56 weed seed:  
57  
58 Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.

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58

Sun and Partial Shade: Proportioned by weight as follows:

- 50 percent Kentucky bluegrass (*Poa pratensis*).
- 30 percent chewings red fescue (*Festuca rubra* variety).
- 10 percent perennial ryegrass (*Lolium perenne*).
- 10 percent redtop (*Agrostis alba*).

Shade: Proportioned by weight as follows:

- 50 percent chewings red fescue (*Festuca rubra* variety).
- 35 percent rough bluegrass (*Poa trivialis*).
- 15 percent redtop (*Agrostis alba*).

## FERTILIZERS

Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

## MULCHES

Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

## PESTICIDES

General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

## PART 3 - EXECUTION

### EXAMINATION

Examine areas to be planted for compliance with requirements and other conditions affecting installation and performance of the Work.

Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

- 1 Uniformly moisten excessively dry soil that is not workable or which is dusty.  
2  
3 Proceed with installation only after unsatisfactory conditions have been corrected.  
4  
5 If contamination by foreign or deleterious material or liquid is present in soil within a planting area,  
6 remove the soil and contamination as directed by Architect and replace with new planting soil.  
7  
8 PREPARATION  
9  
10 Protect structures; utilities; sidewalks; pavements; and other facilities, trees, shrubs, and plantings  
11 from damage caused by planting operations.  
12  
13 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-  
14 bearing water runoff or airborne dust to adjacent properties and walkways.  
15  
16 TURF AREA PREPARATION  
17  
18 General: Prepare planting area for soil placement and mix planting soil according to Section 329113  
19 "Soil Preparation."  
20  
21 Placing Planting Soil: Place and mix planting soil in place over exposed subgrade.  
22  
23 Reduce elevation of planting soil to allow for soil thickness of sod.  
24  
25 Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before  
26 planting. Do not create muddy soil.  
27  
28 Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or  
29 otherwise disturbed after finish grading.  
30  
31 SEEDING  
32  
33 Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity  
34 exceeds 5 mph (8 km/h).  
35  
36 Evenly distribute seed by sowing equal quantities in two directions at right angles to each  
37 other.  
38  
39 Do not use wet seed or seed that is moldy or otherwise damaged.  
40  
41 Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.  
42  
43 Sow seed at a total rate of 3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m)].  
44  
45 Rake seed lightly into top 1/8 inch (3 mm) of soil, roll lightly, and water with fine spray.  
46  
47 Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a  
48 minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in  
49 loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.  
50  
51 Anchor straw mulch by crimping into soil with suitable mechanical equipment.  
52  
53 TURF RENOVATION  
54  
55 Renovate existing turf where indicated.  
56  
57 Renovate turf damaged by Contractor's operations, such as storage of materials or equipment and  
58 movement of vehicles.

- 1
- 2 Reestablish turf where settlement or washouts occur or where minor regrading is required.
- 3 Install new planting soil as required.
- 4
- 5 Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
- 6
- 7 Remove topsoil containing foreign materials, such as oil drippings, fuel spills, stones, gravel, and
- 8 other construction materials resulting from Contractor's operations, and replace with new planting
- 9 soil.
- 10
- 11 Mow, dethatch, core aerate, and rake existing turf.
- 12
- 13 Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required.
- 14 Do not use pre-emergence herbicides.
- 15
- 16 Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and
- 17 legally dispose of them off Owner's property.
- 18
- 19 Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).
- 20
- 21 Apply soil amendments and initial fertilizer required for establishing new turf and mix thoroughly into
- 22 top 4 inches (100 mm) of existing soil. Install new planting soil to fill low spots and meet finish
- 23 grades.
- 24
- 25 Soil Amendment(s): according to requirements of Section 329113 "Soil Preparation".
- 26
- 27 Initial Fertilizer: Commercial fertilizer applied according to manufacturer's recommendations.
- 28
- 29 Apply seed and protect with straw mulch as required for new turf.
- 30
- 31 Water newly planted areas and keep moist until new turf is established.
- 32
- 33 TURF MAINTENANCE
- 34
- 35 General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting,
- 36 and performing other operations as required to establish healthy, viable turf. Roll, regrade, and
- 37 replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and
- 38 installation the same as those used in the original installation.
- 39
- 40 Fill in as necessary soil subsidence that may occur because of settling or other processes.
- 41 Replace materials and turf damaged or lost in areas of subsidence.
- 42
- 43 In areas where mulch has been disturbed by wind or maintenance operations, add new
- 44 mulch and anchor as required to prevent displacement.
- 45
- 46 Apply treatments as required to keep turf and soil free of pests and pathogens or disease.
- 47 Use integrated pest management practices whenever possible to minimize the use of
- 48 pesticides and reduce hazards.
- 49
- 50 Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water
- 51 from sources and to keep turf uniformly moist to a depth of 4 inches (100 mm).
- 52
- 53 Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch.
- 54 Lay out temporary watering system to avoid walking over muddy or newly planted areas.
- 55
- 56 Water turf with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall
- 57 precipitation is adequate.
- 58

1 Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height  
2 without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf  
3 growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and  
4 become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to  
5 maintain the following grass height:

6  
7 Mow Kentucky bluegrass to a height of 1-1/2 to 2 inches (38 to 50 mm).

8  
9 Turf Postfertilization: Apply commercial fertilizer after initial mowing and when grass is dry.

10  
11 Use fertilizer that provides actual nitrogen of at least 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) to  
12 turf area.

#### 13 14 SATISFACTORY TURF

15  
16 Turf installations shall meet the following criteria as determined by Architect:

17  
18 Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of  
19 grass has been established, free of weeds and surface irregularities, with coverage  
20 exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5  
21 inches (125 by 125 mm).

22  
23 Use specified materials to reestablish turf that does not comply with requirements, and continue  
24 maintenance until turf is satisfactory.

#### 25 26 PESTICIDE APPLICATION

27  
28 Apply pesticides and other chemical products and biological control agents according to  
29 requirements of authorities having jurisdiction and manufacturer's written recommendations.  
30 Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner  
31 before each application is performed.

32  
33 Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-  
34 germinated weeds and according to manufacturer's written recommendations.

#### 35 36 CLEANUP AND PROTECTION

37  
38 Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles  
39 before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

40  
41 Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris,  
42 and legally dispose of them off Owner's property.

43  
44 Erect temporary fencing or barricades and warning signs as required to protect newly planted areas  
45 from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after  
46 plantings are established.

47  
48 Remove nondegradable erosion-control measures after grass establishment period.

#### 49 50 MAINTENANCE SERVICE

51  
52 Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer.  
53 Maintain as required in "Turf Maintenance" Article. Begin maintenance immediately after each area  
54 is planted and continue until acceptable turf is established, but for not less than the following periods:

55  
56 Seeded Turf: 60 days from date of planting completion.

- 1           When initial maintenance period has not elapsed before end of planting season, or if turf is
- 2           not fully established, continue maintenance during next planting season.
- 3
- 4
- 5    END OF SECTION

1 **SECTION 32 93 00 – PLANTS**

2  
3  
4 **PART 1 - GENERAL**

5  
6 RELATED DOCUMENTS

7  
8 Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9 and Division 01 Specification Sections, apply to this Section.

10  
11 SUMMARY

12  
13 Section Includes:

14  
15 Plants.  
16 Tree stabilization.  
17 Tree-watering devices.  
18 Landscape edgings.  
19 Tree grates.

20  
21 Related Requirements:

22  
23 Section 329200 "Turf and Grasses" for turf (lawn) and erosion-control materials.

24  
25 Section 329600 "Transplanting" for transplanting non-nursery-grown trees.

26  
27 DEFINITIONS

28  
29 Backfill: The earth used to replace or the act of replacing earth in an excavation.

30  
31 Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown,  
32 with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of  
33 plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root  
34 flare visible at the surface of the ball as recommended by ANSI Z60.1.

35  
36 Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-  
37 established root system reaching sides of container and maintaining a firm ball when removed from  
38 container. Container shall be rigid enough to hold ball shape and protect root mass during shipping  
39 and be sized according to ANSI Z60.1 for type and size of plant required.

40  
41 Finish Grade: Elevation of finished surface of planting soil.

42  
43 Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest.  
44 Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides.  
45 They also include substances or mixtures intended for use as a plant regulator, defoliant, or  
46 desiccant. Some sources classify herbicides separately from pesticides.

47  
48 Pests: Living organisms that occur where they are not desired or that cause damage to plants,  
49 animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents  
50 (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

51  
52 Planting Area: Areas to be planted.

53  
54 Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with  
55 soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See  
56 Section 329113 "Soil Preparation" for drawing designations for planting soils.

1 Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs,  
2 vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

3

4 Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem  
5 or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

6

7 Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

8

9 Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top  
10 surface of a fill or backfill before planting soil is placed.

11

## 12 COORDINATION

13

14 Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are  
15 established and before planting turf areas unless otherwise indicated.

16

17 When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and  
18 promptly repair damage caused by planting operations.

19

## 20 PREINSTALLATION MEETINGS

21

22 Preinstallation Conference: Conduct conference at Project site.

23

## 24 ACTION SUBMITTALS

25

26 Product Data: For each type of product.

27

28 Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

29

30 Samples for Verification: For each of the following:

31

32 Organic Mulch: 1-quart (1-L) volume of each organic mulch required; in sealed  
33 plastic bags labeled with composition of materials by percentage of weight and  
34 source of mulch. Each Sample shall be typical of the lot of material to be furnished;  
35 provide an accurate representation of color, texture, and organic makeup.

36

37 Slow-Release, Tree-Watering Device: One unit of each size required.

38

## 39 INFORMATIONAL SUBMITTALS

40

41 Qualification Data: For landscape Installer. Include list of similar projects completed by Installer  
42 demonstrating Installer's capabilities and experience. Include project names, addresses, and year  
43 completed, and include names and addresses of owners' contact persons.

44

45 Product Certificates: For each type of manufactured product, from manufacturer, and complying with  
46 the following:

47

48 Manufacturer's certified analysis of standard products.

49

50 Analysis of other materials by a recognized laboratory made according to methods  
51 established by the Association of Official Analytical Chemists, where applicable.

52

53 Pesticides and Herbicides: Product label and manufacturer's application instructions specific  
54 to Project.

55

56 Sample Warranty: For special warranty.

57

58

1 CLOSEOUT SUBMITTALS

2

3 Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants  
4 during a calendar year. Submit before expiration of required maintenance periods.

5

6 QUALITY ASSURANCE

7

8 Installer Qualifications: A qualified landscape installer whose work has resulted in successful  
9 establishment of plants.

10

11 Professional Membership: Installer shall be a member in good standing of the American  
12 Nursery and Landscape Association.

13

14 Experience: Three years' experience in landscape installation in addition to requirements.

15

16 Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor  
17 on Project site when work is in progress.

18

19 Provide quality, size, genus, species, and variety of plants indicated, complying with applicable  
20 requirements in ANSI Z60.1.

21

22 Selection of plants purchased under allowances is made by Architect, who tags plants at  
23 their place of growth before they are prepared for transplanting.

24

25 Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

26

27 Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take  
28 height measurements from or near the top of the root flare for field-grown stock and  
29 container-grown stock. Measure main body of tree or shrub for height and spread; do not  
30 measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above  
31 the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the  
32 root flare for larger sizes.

33

34 Other Plants: Measure with stems, petioles, and foliage in their normal position.

35

36 Plant Material Observation: Architect may observe plant material either at place of growth or at site  
37 before planting for compliance with requirements for genus, species, variety, cultivar, size, and  
38 quality. Architect may also observe trees and shrubs further for size and condition of balls and root  
39 systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or  
40 defective material at any time during progress of work. Remove rejected trees or shrubs immediately  
41 from Project site.

42

43 Notify Architect of sources of planting materials pre construction meeting.

44

45 DELIVERY, STORAGE, AND HANDLING

46

47 Packaged Materials: Deliver packaged materials in original, unopened containers showing weight,  
48 certified analysis, name and address of manufacturer, and indication of compliance with state and  
49 Federal laws if applicable.

50

51 Bulk Materials:

52

53 Do not dump or store bulk materials near structures, utilities, walkways and pavements, or  
54 on existing turf areas or plants.

55

56 Provide erosion-control measures to prevent erosion or displacement of bulk materials;  
57 discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water  
58 conveyance systems, or walkways.

- 1  
2 Accompany each delivery of bulk materials with appropriate certificates.  
3  
4 Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun  
5 scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or  
6 bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective  
7 covering of plants during shipping and delivery. Do not drop plants during delivery and handling.  
8  
9 Handle planting stock by root ball.  
10  
11 Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks  
12 (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and  
13 transportation.  
14  
15 If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before  
16 moving and again two weeks after planting.  
17  
18 Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect  
19 from wind and other damage during digging, handling, and transportation.  
20  
21 Deliver plants after preparations for planting have been completed, and install immediately. If  
22 planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect  
23 (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.  
24  
25 Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable  
26 material.  
27  
28 Do not remove container-grown stock from containers before time of planting.  
29  
30 Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray.  
31 Water as often as necessary to maintain root systems in a moist, but not overly wet  
32 condition.  
33  
34 **FIELD CONDITIONS**  
35  
36 Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system  
37 components, and dimensions of plantings and construction contiguous with new plantings by field  
38 measurements before proceeding with planting work.  
39  
40 Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with  
41 maintenance periods to provide required maintenance from date of Substantial Completion.  
42  
43 Spring Planting: May 1 – June 30.  
44 Fall Planting: September 1- October 15.  
45  
46 Weather Limitations: Proceed with planting only when existing and forecasted weather conditions  
47 permit planting to be performed when beneficial and optimum results may be obtained. Apply  
48 products during favorable weather conditions according to manufacturer's written instructions and  
49 warranty requirements.  
50  
51 **WARRANTY**  
52  
53 Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials,  
54 workmanship, or growth within specified warranty period.  
55 Failures include, but are not limited to, the following:  
56  
57 Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate  
58 maintenance, or neglect by Owner.

- 1  
2 Structural failures including plantings falling or blowing over.  
3  
4 Deterioration of metals, metal finishes, and other materials beyond normal weathering.  
5  
6 Warranty Periods: From date of planting completion.  
7  
8 Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.  
9  
10 Ground Covers, Perennials, and Other Plants: 12 months.  
11  
12 Include the following remedial actions as a minimum:  
13  
14 Immediately remove dead plants and replace unless required to plant in the succeeding  
15 planting season.  
16  
17 Replace plants that are more than 25 percent dead or in an unhealthy condition at end of  
18 warranty period.  
19  
20 A limit of one replacement of each plant is required except for losses or replacements due to  
21 failure to comply with requirements.  
22  
23 Provide extended warranty for period equal to original warranty period, for replaced plant  
24 material.  
25

## 26 27 **PART 2 - PRODUCTS**

### 28 29 **PLANT MATERIAL**

- 30  
31 General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing,  
32 and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings  
33 and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root  
34 pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf  
35 and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions,  
36 and disfigurement.  
37  
38 Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is  
39 squeezed between two branches or between branch and trunk ("included bark"); crossing  
40 trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are  
41 unacceptable.  
42  
43 Collected Stock: Do not use plants harvested from the wild, from native stands, from an  
44 established landscape planting, or not grown in a nursery unless otherwise indicated.  
45  
46 Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and  
47 form of plants required. Plants of a larger size may be used if acceptable to Architect, with a  
48 proportionate increase in size of roots or balls.  
49  
50 Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which  
51 begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.  
52  
53 Labeling: Label at least one plant of each variety, size, and caliper with a securely attached,  
54 waterproof tag bearing legible designation of common name and full scientific name, including genus  
55 and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.  
56  
57 If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for  
58 uniform height and spread, and number the labels to assure symmetry in planting.

## 1 FERTILIZERS

2

3 Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade  
4 planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a  
5 form that can be absorbed by plant roots.

6

7 Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent  
8 potassium, by weight plus micronutrients.

9

## 10 MULCHES

11

12 Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs,  
13 consisting of one of the following:

14

15 Type: Shredded hardwood bark.

16

17 Color: Natural.

18

## 19 PESTICIDES

20

21 General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction,  
22 and of type recommended by manufacturer for each specific problem and as required for Project  
23 conditions and application. Do not use restricted pesticides unless authorized in writing by authorities  
24 having jurisdiction.

25

26 Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or  
27 growth of weeds within planted areas at the soil level directly below the mulch layer.

28

29 Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has  
30 already germinated.

31

## 32 TREE-STABILIZATION MATERIALS

33

34 Trunk-Stabilization Materials:

35 Upright Stakes: Rough-sawn, sound, new hardwood or softwood with specified wood  
36 pressure-preservative treatment, free of knots, holes, cross grain, and other defects, 2-by-2-  
37 inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.

38

39 Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

40

## 41 MISCELLANEOUS PRODUCTS

42

43 Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and  
44 shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's  
45 written instructions.

46

47 Burlap: Non-synthetic, biodegradable.

48

49 Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for  
50 Size No. 8.

51

52 Planter Filter Fabric: Woven geotextile manufactured for separation applications and made of  
53 polypropylene, polyolefin, or polyester fibers or combination of them.

54

55 Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of  
56 vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi,  
57 33 percent hydrogel, and a maximum of 5.5 percent inert material.

58

1 **PART 3 - EXECUTION**

2

3 **EXAMINATION**

4

5 Examine areas to receive plants, with Installer present, for compliance with requirements and  
6 conditions affecting installation and performance of the Work.

7

8 Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete  
9 slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner,  
10 turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

11

12 Verify that plants and vehicles loaded with plants can travel to planting locations with  
13 adequate overhead clearance.

14

15 Suspend planting operations during periods of excessive soil moisture until the moisture  
16 content reaches acceptable levels to attain the required results.

17

18 Uniformly moisten excessively dry soil that is not workable or which is dusty.

19

20 If contamination by foreign or deleterious material or liquid is present in soil within a planting area,  
21 remove the soil and contamination as directed by Architect and replace with new planting soil.

22

23 Proceed with installation only after unsatisfactory conditions have been corrected.

24

25 **PREPARATION**

26

27 Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing  
28 plants from damage caused by planting operations.

29

30 Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-  
31 bearing water runoff or airborne dust to adjacent properties and walkways.

32

33 Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline  
34 areas, adjust locations when requested, and obtain Architect's acceptance of layout before  
35 excavating or planting. Make minor adjustments as required.

36

37 Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and  
38 outline areas for multiple plantings.

39

40 **PLANTING AREA ESTABLISHMENT**

41

42 General: Prepare planting area for soil placement and mix planting soil according to Section 329113  
43 "Soil Preparation.

44

45 Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

46

47 Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or  
48 otherwise disturbed after finish grading.

49

50 Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over  
51 prepared soil at application rate according to manufacturer's written recommendations.

52

53 **EXCAVATION FOR TREES AND SHRUBS**

54

55 Planting Pits and Trenches: Excavate circular planting pits.

56

57 Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with  
58 vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom

- 1 raised slightly to support root ball and assist in drainage away from center. Do not further  
2 disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify  
3 sides of planting pit smeared or smoothed during excavation.  
4
- 5 Excavate approximately three times as wide as ball diameter for balled and burlapped and  
6 container-grown stock.  
7
- 8 Do not excavate deeper than depth of the root ball, measured from the root flare to the  
9 bottom of the root ball.  
10
- 11 If area under the plant was initially dug too deep, add soil to raise it to the correct level and  
12 thoroughly tamp the added soil to prevent settling.  
13
- 14 Maintain angles of repose of adjacent materials to ensure stability. Do not excavate  
15 subgrades of adjacent paving, structures, hardscapes, or other new or existing  
16 improvements.  
17
- 18 Maintain supervision of excavations during working hours.  
19
- 20 Keep excavations covered or otherwise protected after working hours.  
21
- 22 Backfill Soil: Subsoil removed from excavations may not be used as backfill soil unless otherwise  
23 indicated.  
24
- 25 Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are  
26 encountered in excavations.  
27
- 28 Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-  
29 draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining  
30 material.  
31
- 32 Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in  
33 tree or shrub planting pits.  
34
- 35 Fill excavations with water and allow to percolate away before positioning trees and shrubs.  
36
- 37 TREE, SHRUB, AND VINE PLANTING  
38
- 39 Inspection: At time of planting, verify that root flare is visible at top of root ball according to  
40 ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the  
41 top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball  
42 still meets size requirements.  
43
- 44 Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not  
45 break.  
46
- 47 Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root  
48 flare 2 inches (50 mm) above adjacent finish grades.  
49
- 50 Backfill: Planting soil.  
51
- 52 After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope,  
53 and wire baskets from tops of root balls and from sides, but do not remove from under root balls.  
54 Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken  
55 before or during planting operation.  
56

- 1 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When  
2 planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill.  
3 Repeat watering until no more water is absorbed.  
4
- 5 Place planting tablets equally distributed around each planting pit when pit is approximately one-half  
6 filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in  
7 bottom of the hole.  
8 Quantity: Three for each caliper inch of plant.  
9
- 10 Continue backfilling process. Water again after placing and tamping final layer of soil.  
11
- 12 Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare  
13 adjacent finish grades.  
14
- 15 Backfill: Planting soil  
16
- 17 Carefully remove root ball from container without damaging root ball or plant.  
18
- 19 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets.  
20 When planting pit is approximately one-half filled, water thoroughly before placing remainder  
21 of backfill. Repeat watering until no more water is absorbed.  
22
- 23 Place planting tablets equally distributed around each planting pit when pit is approximately  
24 one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not  
25 place tablets in bottom of the hole.  
26
- 27 Quantity: Two per plant.  
28
- 29 Continue backfilling process. Water again after placing and tamping final layer of soil.  
30
- 31 TREE, SHRUB, AND VINE PRUNING  
32
- 33 Remove only dead, dying, or broken branches. Do not prune for shape.  
34 Prune, thin, and shape trees, shrubs, and vines as directed by Architect.  
35 Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and  
36 arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only  
37 injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.  
38 Do not apply pruning paint to wounds.  
39
- 40 TREE STABILIZATION  
41
- 42 Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless  
43 otherwise indicated:  
44
- 45 Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper.  
46 Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use  
47 a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below  
48 bottom of backfilled excavation and to extend one-third of trunk height above grade. Set  
49 vertical stakes and space to avoid penetrating root balls or root masses.  
50
- 51 In "Upright Staking and Tying" Subparagraph below, one stake may be acceptable for high-  
52 branched trees in semiprotected locations.  
53
- 54 Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet (3.6 m) high  
55 and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m)  
56 high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.  
57

1 Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack  
2 to avoid rigid restraint of tree.

3

#### 4 PLACING SOIL IN PLANTERS

5

6 Place a layer of drainage gravel at least 4 inches (100 mm) thick in bottom of planter. Cover bottom  
7 with filter fabric and wrap filter fabric 6 inches (150 mm) up on all sides. Duct tape along the entire  
8 top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.

9

10 Fill planter with planting soil. Place soil in lightly compacted layers to an elevation of 1-1/2 inches (38  
11 mm) below top of planter, allowing natural settlement.

12

#### 13 GROUND COVER AND PLANT PLANTING

14

15 Set out and space ground cover and plants other than trees, shrubs, and 24 inches (600 mm) apart  
16 or as indicated on Drawings in even rows with triangular spacing.

17

18 Use planting soil for backfill.

19

20 Dig holes large enough to allow spreading of roots.

21

22 For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root  
23 system but to a depth not less than two nodes.

24

25 Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to  
26 hold water.

27

28 Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

29

30 Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from  
31 transplanting shock.

32

#### 33 PLANTING AREA MULCHING

34

35 Mulch backfilled surfaces of planting areas and other areas indicated.

36

37 Organic Mulch in Planting Areas: Apply 3-inch (75-mm) average thickness of organic mulch  
38 over whole surface of planting area, and finish level with adjacent finish grades. Do not place  
39 mulch within 3 inches (75 mm) of trunks or stems.

40

#### 41 EDGING INSTALLATION

42

43 Shovel-Cut Edging: Separate mulched areas from turf areas with a 45-degree, 4- to 6-inch- (100- to  
44 150-mm-) deep, shovel-cut edge.

45

#### 46 PLANT MAINTENANCE

47

48 Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting  
49 saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical  
50 position, and performing other operations as required to establish healthy, viable plantings.

51 Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace  
52 mulch materials damaged or lost in areas of subsidence.

53 Apply treatments as required to keep plant materials, planted areas, and soils free of pests and  
54 pathogens or disease. Use integrated pest management practices when possible to minimize use of  
55 pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage,  
56 mechanical controls such as traps, and biological control agents.

57

58

## 1 PESTICIDE APPLICATION

2

3 Apply pesticides and other chemical products and biological control agents according to authorities  
4 having jurisdiction and manufacturer's written recommendations. Coordinate applications with  
5 Owner's operations and others in proximity to the Work. Notify Owner before each application is  
6 performed.

7

8 Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas  
9 according to manufacturer's written recommendations. Do not apply to seeded areas.

10

11 Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-  
12 germinated weeds and according to manufacturer's written recommendations.

13

## 14 REPAIR AND REPLACEMENT

15

16 General: Repair or replace existing or new trees and other plants that are damaged by construction  
17 operations, in a manner approved by Architect.

18

19 Submit details of proposed pruning and repairs.

20

21 Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.

22

23 Replace trees and other plants that cannot be repaired and restored to full-growth status, as  
24 determined by Architect.

25

26 Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before  
27 the end of the corrections period or are damaged during construction operations that Architect  
28 determines are incapable of restoring to normal growth pattern.

29

30 Provide new trees of same size as those being replaced for each tree.

31

32 Species of Replacement Trees: Same species being replaced.

33

## 34 CLEANING AND PROTECTION

35

36 During planting, keep adjacent paving and construction clean and work area in an orderly condition.  
37 Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved  
38 areas.

39

40 Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris  
41 and legally dispose of them off Owner's property.

42

43 Protect plants from damage due to landscape operations and operations of other contractors and  
44 trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace  
45 damaged plantings.

46

47 After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape,  
48 labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

49

50 At time of Substantial Completion, verify that tree-watering devices are in good working order and  
51 leave them in place. Replace improperly functioning devices.

52

## 53 MAINTENANCE SERVICE

54

55 Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape  
56 Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after  
57 plants are installed and continue until plantings are acceptably healthy and well established, but for  
58 not less than maintenance period below:

- 1
- 2           Maintenance Period: 12 months from date of planting completion.
- 3
- 4   Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees
- 5   of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance
- 6   immediately after plants are installed and continue until plantings are acceptably healthy and well
- 7   established, but for not less than maintenance period below:
- 8
- 9           Maintenance Period: 12 months from date of planting completion.
- 10
- 11
- 12   END OF SECTION

1 **SECTION 32 96 00- TRANSPLANTING**

2  
3  
4 **PART 1 - GENERAL**

5  
6 RELATED DOCUMENTS

7  
8 Drawings and general provisions of the Contract, including General and Supplementary Conditions  
9 and Division 01 Specification Sections, apply to this Section.

10  
11 SUMMARY

12  
13 Section includes transplanting non-nursery-grown trees.

14  
15 Related Requirements:

16  
17 Section 015639 "Temporary Tree and Plant Protection" for protecting, trimming, pruning,  
18 repairing, and replacing existing trees to remain that interfere with, or are affected by,  
19 execution of the Work.

20  
21 Section 329300 "Plants" for new trees from nursery-grown sources.

22  
23 DEFINITIONS

24  
25 General: See definitions in ANSI A300 (Part 6) and in ANSI Z60.1 pertaining to field-grown trees,  
26 except as otherwise defined in this Section.

27  
28 Caliper: Diameter of a trunk as measured by a diameter tape at a height 6 inches (150 mm) above  
29 the root flare for trees up to, and including, 4-inch (100-mm) size at this height; and as measured at a  
30 height of 12 inches (300 mm) above the root flare for trees larger than 4-inch (100-mm) size.

31  
32 Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape the  
33 average of the smallest and largest diameters at a height 54 inches (1372 mm) above the ground  
34 line for trees with caliper of 8 inches (200 mm) or greater as measured at a height of 12 inches (300  
35 mm) above the root flare.

36  
37 Root-Ball Depth: Measured from bottom of trunk flare to the bottom of root ball.

38  
39 Root-Ball Width: Measured horizontally across the root ball with an approximately circular form or the  
40 least dimension for non-round root balls, not necessarily centered on the tree trunk, but within  
41 tolerance according to ANSI Z60.1.

42  
43 Root Flare: Also called "trunk flare." The area at the base of the tree's stem or trunk where the stem  
44 or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

45  
46 INFORMATIONAL SUBMITTALS

47  
48 Qualification Data: For qualified tree-service firm and arborist.

49  
50 Certification: From arborist, certifying that transplanted trees have been protected during  
51 construction and that trees were promptly and properly treated and repaired when damaged.

52  
53 Maintenance Recommendations: From arborist, recommended procedures to be established by  
54 Owner for care and protection of trees after completing the Work.

55  
56 Submit before completing the Work.

1 Existing Conditions: Documentation of existing trees indicated to be transplanted, which establishes  
2 preconstruction conditions that might be misconstrued as damage caused by construction activities.

3

4 Use sufficiently detailed color photographs or video recordings. Color shall accurately depict  
5 hue condition of foliage and bark.

6

7 Include drawings and notations to indicate specific wounds and damage conditions of each  
8 tree designated to be transplanted.

9

10 Tree-Transplanting Program: Submit before work begins.

11

12 Sample Warranties: For special warranties.

13

14 Tree-maintenance reports.

15

## 16 QUALITY ASSURANCE

17

18 Tree-Service Firm Qualifications: An experienced landscaping contractor or tree-moving firm that has  
19 successfully completed transplanting work similar to that required for this Project and that will assign  
20 an experienced, qualified arborist to Project site during execution of the Work.

21

22 Arborist Qualifications: Certified Arborist as certified by ISA.

23

## 24 DELIVERY, STORAGE, AND HANDLING

25

26 Packaged Materials: Deliver packaged materials in original, unopened containers showing weight,  
27 certified analysis, name and address of manufacturer, and indication of conformance with state and  
28 federal laws if applicable.

29

30 Bulk Materials:

31

32 Do not dump or store bulk materials near structures, utilities, walkways and pavements, or  
33 on existing turf areas or trees.

34

35 Provide erosion-control measures to prevent erosion or displacement of bulk materials,  
36 discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water  
37 conveyance systems, or walkways.

38

39 Accompany each delivery with appropriate certificates.

40

41 Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and  
42 other handling and tying damage. Do not bend or bind-tie trees in such a manner as to destroy their  
43 natural shape.

44

45 Completely cover foliage when transporting trees while they are in foliage.

46

47 Handle trees by root ball. Do not drop trees.

48

49 Move trees after preparations for planting have been completed, and install immediately. If planting  
50 is delayed more than six hours after moving, set trees in their appropriate aspect (sun, filtered sun,  
51 or shade), protect from weather and mechanical damage, and keep roots moist.

52

## 53 FIELD CONDITIONS

54

55 Field Measurements: Verify final grade elevations and final locations of trees and construction  
56 contiguous with trees by field measurements before proceeding with transplanting work. Perform  
57 transplanting only after finish grades are established.

58

1 Seasonal Restrictions: Transplant trees during the following in-season periods:

2  
3 Spring: May 1 - May 30.

4  
5 Fall: September 1 - 30.

6  
7 Weather Limitations: Proceed with transplanting only when existing and forecasted weather  
8 conditions permit planting to be performed when beneficial and optimum results may be obtained. Do  
9 not transplant during excessively wet or frozen conditions. Apply products during favorable weather  
10 conditions according to manufacturer's written instructions and warranty requirements.

11  
12 Coordination with Turf Areas (Lawns): Perform transplanting before planting turf areas unless  
13 otherwise indicated.

14  
15 When transplanting after planting turf areas, protect turf areas, and promptly repair damage  
16 caused by transplanting operations.

17  
18 Coordination with Planting Beds: Perform transplanting before planting bedded areas unless  
19 otherwise indicated.

20  
21 When transplanting after planting bedded areas, protect bedding plants, and promptly repair  
22 damage caused by transplanting operations.

## 23 24 WARRANTY

25  
26 Installer's Special Warranty: Tree-service firm agrees to repair or replace trees and related materials  
27 that fail within specified warranty period.

28  
29 Failures include, but are not limited to, the following:

30  
31 Death and unsatisfactory growth except for defects resulting from abuse, lack of  
32 adequate maintenance, or neglect by Owner, or incidents that are beyond  
33 Contractor's control.

34  
35 Death and unsatisfactory growth is defined as more than 25 percent dead or in an  
36 unhealthy condition or failure to meet general performance requirements at end of  
37 warranty period.

38  
39 Structural failures including trees falling or blowing over.

40  
41 Warranty Periods from Date of Transplanting Completion:

42  
43 Trees: 12 months.

44  
45 Include the following remedial actions as a minimum:

46  
47 Remove dead trees and trees with unsatisfactory growth at end of warranty period;  
48 replace when directed.

49  
50 A limit of one replacement of each tree will be required except for losses or  
51 replacements due to failure to comply with requirements.

52  
53 Replace materials and devices related to tree plantings.

54  
55 Provide extended warranty for period equal to original warranty period, for replaced  
56 trees.

1 MAINTENANCE SERVICE

2  
3 Initial Maintenance Service: Provide tree maintenance by skilled employees of tree-service firm and  
4 as required in Part 3. Begin maintenance immediately after trees are installed and continue until  
5 plantings are healthy and well established but for not less than maintenance period below.

6  
7 Maintenance Period: 12 months from date of transplanting completion.

8  
9 Continuing Maintenance Proposal: From tree-service firm to Owner, in the form of a standard yearly  
10 (or other period) maintenance agreement, starting on date initial maintenance service is concluded.  
11 State services, obligations, conditions, and terms for agreement period and for future renewal  
12 options.

13  
14  
15 **PART 2 - PRODUCTS**

16  
17 PERFORMANCE REQUIREMENTS

18  
19 General Performance: Transplanted trees shall be healthy and resume vigorous growth within one  
20 year of transplanting without dieback due to defective extracting, handling, planting, maintenance, or  
21 other defects in the Work.

22  
23 PLANTING MATERIALS

24  
25 Backfill Soil: Excavated soil mixed with planting soil of suitable moisture content and granular texture  
26 for placing and compacting in planting pit around tree, and free of stones, roots, plants, sod, clods,  
27 clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster,  
28 building debris, and other extraneous materials harmful to plant growth.

29  
30 Mixture: Well-blended mix of two parts excavated soil to one part planting soil.

31  
32 Planting Soil: Planting soil as specified in Section 329113 "Soil Preparation."

33  
34 TREE-STABILIZATION MATERIALS

35  
36 Trunk-Stabilization Materials:

37  
38 Upright and Guy Stakes: Rough-sawn, sound, new hardwood or softwood with specified  
39 wood preservative treatment by pressure process, free of knots, holes, cross grain, and  
40 other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one  
41 end.

42  
43 Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.

44  
45 MISCELLANEOUS PRODUCTS

46  
47 Organic Mulch: Shredded hardwood as specified in Section 329300 "Plants."

48  
49 Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees. Deliver  
50 in original, sealed, and fully labeled containers and mix according to manufacturer's written  
51 instructions.

52  
53 Burlap: Non-synthetic, biodegradable.

54  
55 Pesticides: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction,  
56 and of type recommended in writing by manufacturer for each specific problem and as required for  
57 Project conditions and application. Do not use restricted pesticides unless authorized in writing by  
58 authorities having jurisdiction.

1  
2 Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or  
3 growth of weeds within planted areas at the soil level directly below the mulch layer.

4  
5 Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed  
6 growth that has already germinated.

7  
8 Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade  
9 planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a  
10 form that can be absorbed by plant roots.

11  
12 Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent  
13 potassium, by weight plus micronutrients.

14  
15

### 16 **PART 3 - EXECUTION**

17

#### 18 **EXAMINATION**

19

20 Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and  
21 sedimentation-control measures are in place. Verify that flows of water redirected from construction  
22 areas or generated by construction activity do not enter or cross transplanting areas.

23

24 For the record, prepare written report, endorsed by arborist, listing conditions detrimental to  
25 transplanting work and tree protection and health.

26

27 Proceed with transplanting only after unsatisfactory conditions have been corrected.

28

#### 29 **PREPARATION**

30

31 Protect structures, utilities, sidewalks, pavements, other facilities, turf areas, and other plants and  
32 planting areas from damage caused by transplanting operations.

33

34 Utility Locator Service: Notify utility locator service for area where Project is located before beginning  
35 excavation.

36

37 Locate and clearly identify trees for transplanting. Tie a 1-inch (25-mm) blue-vinyl tape around each  
38 tree at 54 inches (1372 mm) above the ground.

39

40 Lay out individual transplant locations and areas for multiple plantings. Stake locations, outline  
41 areas, adjust locations when requested, and obtain Architect's acceptance of layout before  
42 transplanting. Make minor adjustments as required.

43

44 Apply antidesiccant to trees uniformly, using power spray to provide an adequate film over trunks  
45 (before wrapping), branches, stems, twigs, and foliage to protect during extracting, handling, and  
46 transportation.

47

48 If deciduous trees are moved in full leaf, spray with antidesiccant before extracting and again  
49 two weeks after transplanting.

50

51 Wrap trees with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind  
52 and other damage during extracting, handling, and transporting.

53

#### 54 **PREPARATORY PRUNING**

55

56 Root Pruning: Perform preparatory root pruning under direction of arborist as far in advance of  
57 extracting each tree as the Project Schedule allows.

58

- 1 Dig exploratory pits or trench by hand around perimeter of tree at indicated root-ball width to  
2 determine locations of main lateral roots.  
3
- 4 Dig trench by hand around perimeter of tree at indicated root-ball width to the depth of the  
5 root system. Do not use a backhoe or other equipment that rips, tears, or pulls roots.  
6
- 7 Root-Ball Width: Minimum 9 inches (229 mm) of root-ball diameter, or least dimension for  
8 non-round root balls, for each inch (25 mm) of tree caliper being transplanted.  
9
- 10 If encountering large, main lateral roots, expose roots beyond excavation limits as required  
11 to bend and redirect them without breaking.  
12
- 13 Use narrow-tine spading forks to comb soil to expose roots with minimal damage to root  
14 system.  
15
- 16 Cut exposed roots manually with sharp pruning instruments; do not break, tear, chop, or  
17 slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.  
18
- 19 Do not paint or apply sealants on cut root ends.  
20
- 21 Backfill trench with excavated soil.  
22

### 23 EXCAVATING PLANTING PITS

- 24
- 25 General: Excavate under supervision of the arborist.  
26
- 27 Excavate planting pits or trenches with sides sloping. Trim perimeter of bottom leaving  
28 center area of bottom raised slightly to support root ball and assist in drainage away from  
29 center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil.  
30 Scarify sides of planting pit smeared or smoothed during excavation.  
31
- 32 Excavate approximately three times as wide as root ball.  
33
- 34 Keep excavations covered or otherwise protected until replanting trees.  
35
- 36 Subsoil removed from excavations may not be used as planting soil.  
37
- 38 Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees are encountered  
39 in excavations.  
40
- 41 Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-  
42 draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining  
43 material.  
44
- 45 Seepage: Notify Architect if subsoil conditions evidence unexpected water seepage into tree-planting  
46 pits.  
47
- 48 Drainage: Fill planting pit or trench with 6 inches (152 mm) of water and time the infiltration rate of  
49 the soil. If the drainage rate is less than 0.25 inch (6 mm) per hour, notify Architect to determine need  
50 for subsurface drainage.  
51
- 52 Saline or Sodic Soils: Completely fill excavations with water and allow to percolate away before  
53 positioning trees.  
54
- ### 55 EXTRACTING TREES
- 56
- 57 General: Extract trees under supervision of the arborist.  
58 Orientation Marking: Mark the north side of each tree with non-permanent paint before extracting.

- 1 Root-Ball Width: Minimum 10 inches (250 mm) of root-ball diameter, or least dimension for non-  
2 round root balls, for each inch (25 mm) of tree caliper being transplanted.  
3
- 4 Root-Ball Depth: As determined by the arborist for each species and size of tree and for site  
5 conditions at original and planting locations.  
6
- 7 Digging:  
8
- 9 Dig and clear a pit by hand to the depth of the root system. Do not use a backhoe or other  
10 equipment that rips, tears, or pulls roots.  
11
- 12 Use narrow-tine spading forks to comb soil to expose roots with minimal damage to root  
13 system.  
14
- 15 If encountering large, main lateral roots, expose roots beyond excavation limits as required  
16 to bend and redirect them without breaking.  
17
- 18 Cut exposed roots manually with sharp pruning instruments; do not break, tear, chop, or  
19 slant the cuts. Do not paint or apply sealants on cut root ends.  
20
- 21 Construct box tight against root system sides and bottom as pit is dug. Brace and support  
22 box to prevent breaking of root ball.  
23
- 24 Temporarily support and protect exposed roots from damage until they are permanently  
25 redirected and covered with soil. Cover roots with burlap and keep them moist until planted.  
26

## 27 PLANTING

- 28
- 29 Planting Standard: Perform planting according to ANSI A300 (Part 6) unless otherwise indicated.  
30
- 31 Before planting, verify that root flare is visible at top of root ball. If root flare is not visible, remove soil  
32 in a level manner from the root ball to where the top-most root emerges from the trunk. After soil  
33 removal to expose the root flare, verify that root ball still meets size requirements.  
34
- 35 Ensure that root flare is visible after planting.  
36
- 37 Remove injured roots by cutting cleanly; do not break. Do not paint or apply sealants on cut root  
38 ends.  
39
- 40 Orientation: Position the tree so that its north side, marked before extracting, is facing north in its  
41 new location.  
42
- 43 Set tree plumb and in center of planting pit with bottom of root flare 2 inches (50 mm) above adjacent  
44 finish grades.  
45
- 46 Use specified backfill soil for backfill.  
47
- 48 If area under the tree was initially dug too deep, add backfill to raise it to the correct level  
49 and thoroughly tamp the added soil to prevent settling.  
50
- 51 After placing some backfill around root ball to stabilize plant, begin backfilling.  
52
- 53 Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets.  
54 When planting pit is approximately one-half filled, water thoroughly before placing remainder  
55 of backfill. Repeat watering until no more water is absorbed.  
56
- 57 Redirect exposed root ends downward in backfill areas where possible. Hand-expose roots  
58 as required to bend and redirect them without breaking. If encountered immediately adjacent

1 to location of new construction and redirection is not practical, cut roots approximately 3  
2 inches (75 mm) back from new construction and as required for root pruning.

3  
4 Place planting tablets in each planting pit when pit is approximately one-half filled; in  
5 amounts recommended by arborist. Place tablets beside the root ball about 1 inch (25 mm)  
6 from root tips; do not place tablets in bottom of the hole.

7  
8 Continue backfilling process. Water again after placing and tamping final layer of soil.

### 9 10 TREE STABILIZATION

11  
12 Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless  
13 otherwise indicated on Drawings.

14  
15 Upright Staking and Tying: Stake only as required to prevent wind tip out. Use a minimum of  
16 three stakes of length required to penetrate at least 18 inches (450 mm) below bottom of  
17 backfilled excavation and to extend one-third of trunk height above grade. Set stakes vertical  
18 and space to avoid penetrating root balls or root masses.

19  
20 Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack  
21 to avoid rigid restraint of tree.

22  
23 Support trees with two strands of tie wire, connected to the brass grommets of tree-tie  
24 webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

### 25 26 MULCHING

27  
28 Organic Mulch: Apply 3-inch (75-mm) average thickness of organic mulch over whole surface of  
29 planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75  
30 mm) of trunks or stems.

### 31 32 INSTALLING SLOW-RELEASE WATERING DEVICE

33  
34 Provide one device for each tree.

35  
36 Place device on top of the mulch at base of tree and fill with water according to manufacturer's  
37 written instructions.

### 38 39 TREE MAINTENANCE

40  
41 Perform tree maintenance as recommended by arborist. Maintain arborist observation of  
42 transplanting work.

43  
44 Maintain trees by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting  
45 saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical  
46 position, and performing other operations as required to establish healthy, viable plantings. Treat as  
47 required to keep trees free of insects and disease.

48  
49 From time of preparatory root pruning measure soil moisture adjacent to edge of each root ball  
50 weekly. Record findings and weather conditions.

51  
52 Fill areas of soil subsidence with backfill soil. Replenish mulch materials damaged or lost in areas of  
53 subsidence.

54  
55 Apply treatments as required to keep tree materials, planted areas, and soils free of pests and  
56 pathogens or disease. Use integrated pest management practices whenever possible to minimize  
57 the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off  
58 foliage, mechanical controls such as traps, and biological control agents.

1 Pesticide Application: Apply pesticides and other chemical products and biological control agents in  
2 accordance with authorities having jurisdiction and manufacturer's written instructions. Coordinate  
3 applications with Owner's operations and others in proximity to the Work. Notify Owner before each  
4 application is performed.

5  
6 Pre-Emergent Herbicides (Selective and Non-Selective): Apply in accordance with  
7 manufacturer's written instructions. Do not apply to seeded areas.

8  
9 Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat  
10 already-germinated weeds and in accordance with manufacturer's written instructions.

11  
12 **REPAIR AND REPLACEMENT**

13  
14 General: Repair or replace transplanted trees and other plants indicated to remain or be relocated  
15 that are damaged by construction operations, in a manner recommended by the arborist and  
16 approved by Architect.

17  
18 Submit details of proposed pruning and repairs.

19  
20 Perform repairs of damaged trunks, branches, and roots within 24 hours according to  
21 arborist's written instructions.

22  
23 Replace trees and other plants that cannot be repaired and restored to full-growth status, as  
24 determined by Architect.

25  
26 Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before  
27 the end of the corrections period or are damaged during construction operations that Architect  
28 determines are incapable of restoring to normal growth pattern.

29  
30 Provide new trees of same size as those being replaced.

31  
32 Species of Replacement Trees: Same species being replaced.

33  
34 **CLEANUP AND PROTECTION**

35  
36 During transplanting, keep adjacent paving and construction clean and work area in an orderly  
37 condition.

38  
39 Protect trees from damage due to transplanting operations and operations of other contractors and  
40 trades. Maintain protection during transplanting and maintenance periods. Treat, repair, or replace  
41 damaged plantings.

42  
43 After planting and before Substantial Completion, remove tags, markings, tie tape, labels, wire,  
44 burlap, and other debris from transplanted trees, planting areas, and Project site.

45  
46 **DISPOSAL OF SURPLUS AND WASTE MATERIALS**

47  
48 Except for materials indicated to be recycled, remove surplus soil, excess excavated material, waste  
49 materials, displaced plants, trash, and debris, and legally dispose of them off Owner's property.

50  
51 Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or  
52 spread soil as directed by Architect.

53  
54 Except for materials indicated to be retained on Owner's property or recycled, remove excess  
55 excavated material, waste materials, displaced plants, trash, and debris, and legally dispose of them  
56 off Owner's property.

57  
58 **END OF SECTION**