

**If you plan to submit a bid directly to the Department of Transportation**

**PREQUALIFICATION**

Any contractor who desires to become pre-qualified to bid on work advertised by IDOT must submit the properly completed pre-qualification forms to the Bureau of Construction no later than 4:30 p.m. prevailing time twenty-one days prior to the letting of interest. This pre-qualification requirement applies to first time contractors, contractors renewing expired ratings, contractors maintaining continuous pre-qualification or contractors requesting revised ratings. To be eligible to bid, existing pre-qualification ratings must be effective through the date of letting.

**REQUESTS FOR AUTHORIZATION TO BID**

Contractors downloading and/or ordering CD-ROM's and are wanting to bid on items included in a particular letting must submit the properly completed "Request for Authorization to Bid/or Not For Bid Status" (BDE 124INT) and the ORIGINAL, signed and notarized, "Affidavit of Availability" (BC 57) to the proper office no later than 4:30 p.m. prevailing time, three (3) days prior to the letting date.

**WHO CAN BID ?**

Bids will be accepted from only those companies that request and receive written **Authorization to Bid** from IDOT's Central Bureau of Construction.

**WHAT CONSTITUTES WRITTEN AUTHORIZATION TO BID?** When a prospective prime bidder submits a "Request for Authorization to Bid/or Not For Bid Status"(BDE 124INT) he/she must indicate at that time which items are being requested For Bidding purposes. Only those items requested For Bidding will be analyzed. After the request has been analyzed, the bidder will be issued a **Proposal Denial and/or Authorization Form**, approved by the Central Bureau of Construction, that indicates which items have been approved For Bidding. If **Authorization to Bid** cannot be approved, the **Proposal Denial and/or Authorization Form** will indicate the reason for denial.

**ABOUT AUTHORIZATION TO BID:** Firms that have not received an authorization form within a reasonable time of complete and correct original document submittal should contact the department as to status. This is critical in the week before the letting. These documents must be received three days before the letting date. Firms unsure as to authorization status should call the Prequalification Section of the Bureau of Construction at the number listed at the end of these instructions.

**ADDENDA AND REVISIONS:** It is the contractor's responsibility to determine which, if any, addenda or revisions pertain to any project they may be bidding. Failure to incorporate all relevant addenda or revisions may cause the bid to be declared unacceptable.

Each addendum will be placed with the contract number. Addenda and revisions will also be placed on the Addendum/Revision Checklist and each subscription service subscriber will be notified by e-mail of each addendum and revision issued.

The Internet is the Department's primary way of doing business. The subscription server e-mails are an added courtesy the Department provides. It is suggested that bidder check IDOT's website <http://www.dot.il.gov/desenv/delett.html> before submitting final bid information.

**IDOT is not responsible for any e-mail related failures.**

Addenda Questions may be directed to the Contracts Office at (217)782-7806 or [D&Econtracts@dot.il.gov](mailto:D&Econtracts@dot.il.gov)

Technical Questions about downloading these files may be directed to Tim Garman (217)524-1642 or [garmantr@dot.il.gov](mailto:garmantr@dot.il.gov).

**WHAT MUST BE INCLUDED WHEN BIDS ARE SUBMITTED?:** Bidders need not return the entire proposal when bids are submitted. That portion of the proposal that must be returned includes the following:

1. All documents from the Proposal Cover Sheet through the Proposal Bid Bond
2. Other special documentation and/or information that may be required by the contract special provisions

All proposal documents, including Proposal Guaranty Checks or Proposal Bid Bonds, should be stapled together to prevent loss when bids are processed by IDOT personnel.

**ABOUT SUBMITTING BIDS:** It is recommended that bidders deliver bids in person to insure they arrive at the proper location prior to the time specified for the receipt of bids. Any bid received at the place of letting after the time specified will not be accepted.

**WHO SHOULD BE CALLED IF ASSISTANCE IS NEEDED?**

<b>Questions Regarding</b>	<b>Call</b>
Prequalification and/or Authorization to Bid	(217)782-3413
Preparation and submittal of bids	(217)782-7806
Mailing of plans and proposals	(217)782-7806
Electronic plans and proposals	(217)524-1642

**ADDENDUMS AND REVISIONS TO THE PROPOSAL FORMS**

Planholders should verify that they have received and incorporated the addendum and/or revision prior to submitting their bid. Failure by the bidder to include an addendum could result in a bid being rejected as irregular.

# 145

RETURN WITH BID

Proposal Submitted By
Name
Address
City

Letting March 7, 2008

BIDDERS NEED NOT RETURN THE ENTIRE PROPOSAL  
(See instructions inside front cover)

### NOTICE TO PROSPECTIVE BIDDERS

This proposal can be used for bidding purposes by only those companies that request and receive written AUTHORIZATION TO BID from IDOT's Central Bureau of Construction.

(SEE INSTRUCTIONS ON THE INSIDE OF COVER)

# Notice To Bidders, Specifications, Proposal, Contract and Contract Bond



Illinois Department  
of Transportation

Springfield, Illinois 62764

Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Route  
Project SBIL-TE-00D8(113)  
District 8 Construction Funds

PLEASE MARK THE APPROPRIATE BOX BELOW:

- A Bid Bond is included.
- A Cashier's Check or a Certified Check is included

Prepared by

F

Checked by

(Printed by authority of the State of Illinois)

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## INSTRUCTIONS

**ABOUT IDOT PROPOSALS:** All proposals issued by IDOT are potential bidding proposals. Each proposal contains all Certifications and Affidavits, a Proposal Signature Sheet and a Proposal Bid Bond required for Prime Contractors to submit a bid after written **Authorization to Bid** has been issued by IDOT's Central Bureau of Construction.

**WHO CAN BID?:** Bids will be accepted from only those companies that request and receive written **Authorization to Bid** from IDOT's Central Bureau of Construction. To request authorization, a potential bidder must complete and submit Part B of the Request for Authorization to Bid/or Not For Bid Status form (BDE 124 INT) and submit an original Affidavit of Availability (BC 57).

**WHAT CONSTITUTES WRITTEN AUTHORIZATION TO BID?:** When a prospective prime bidder submits a "Request for Proposal Forms and Plans" he/she must indicate at that time which items are being requested For Bidding purposes. Only those items requested For Bidding will be analyzed. After the request has been analyzed, the bidder will be issued a **Proposal Denial and/or Authorization Form**, approved by the Central Bureau of Construction, that indicates which items have been approved For Bidding. If **Authorization to Bid** cannot be approved, the **Proposal Denial and/or Authorization Form** will indicate the reason for denial. If a contractor has requested to bid but has not received a **Proposal Denial and/or Authorization Form**, they should contact the Central Bureau of Construction in advance of the letting date.

**WHAT MUST BE INCLUDED WHEN BIDS ARE SUBMITTED?:** Bidders need not return the entire proposal when bids are submitted. That portion of the proposal that must be returned includes the following:

1. All documents from the Proposal Cover Sheet through the Proposal Bid Bond
2. Other special documentation and/or information that may be required by the contract special provisions

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**ABOUT SUBMITTING BIDS:** It is recommended that bidders deliver bids in person to insure they arrive at the proper location prior to the time specified for the receipt of bids. Any bid received at the place of letting after the time specified will not be accepted.

### WHO SHOULD BE CALLED IF ASSISTANCE IS NEEDED?

Questions Regarding	Call
Prequalification and/or Authorization to Bid	217/782-3413
Preparation and submittal of bids	217/782-7806
Mailing of CD-ROMS	217/782-7806



# RETURN WITH BID



## PROPOSAL

TO THE DEPARTMENT OF TRANSPORTATION

1. Proposal of \_\_\_\_\_

\_\_\_\_\_

Taxpayer Identification Number (Mandatory) \_\_\_\_\_

for the improvement identified and advertised for bids in the Invitation for Bids as:

**Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Project SBIL-TE-00D8(113)  
Route  
District 8 Construction Funds**

**This project consists of the construction of a welcome center, restrooms, parking lot, sidewalks, water and sanitary sewer service lines and drainage appurtenances, located adjacent to Confluence Tower Drive, South of West Piasa lane, in the village of Hartford.**

2. The undersigned bidder will furnish all labor, material and equipment to complete the above described project in a good and workmanlike manner as provided in the contract documents provided by the Department of Transportation. This proposal will become part of the contract and the terms and conditions contained in the contract documents shall govern performance and payments.

**RETURN WITH BID**

3. **ASSURANCE OF EXAMINATION AND INSPECTION/WAIVER.** The undersigned further declares that he/she has carefully examined the proposal, plans, specifications, form of contract and contract bond, and special provisions, and that he/she has inspected in detail the site of the proposed work, and that he/she has familiarized themselves with all of the local conditions affecting the contract and the detailed requirements of construction, and understands that in making this proposal he/she waives all right to plead any misunderstanding regarding the same.
  
4. **EXECUTION OF CONTRACT AND CONTRACT BOND.** The undersigned further agrees to execute a contract for this work and present the same to the department within fifteen (15) days after the contract has been mailed to him/her. The undersigned further agrees that he/she and his/her surety will execute and present within fifteen (15) days after the contract has been mailed to him/her contract bond satisfactory to and in the form prescribed by the Department of Transportation, in the penal sum of the full amount of the contract, guaranteeing the faithful performance of the work in accordance with the terms of the contract.
  
5. **PROPOSAL GUARANTY.** Accompanying this proposal is either a bid bond on the department form, executed by a corporate surety company satisfactory to the department, or a proposal guaranty check consisting of a bank cashier's check or a properly certified check for not less than 5 per cent of the amount bid or for the amount specified in the following schedule:

<u>Amount of Bid</u>		<u>Proposal Guaranty</u>	<u>Amount of Bid</u>		<u>Proposal Guaranty</u>	
Up to	\$5,000 .....	\$150	\$2,000,000	to	\$3,000,000 .....	\$100,000
\$5,000	to \$10,000 .....	\$300	\$3,000,000	to	\$5,000,000 .....	\$150,000
\$10,000	to \$50,000 .....	\$1,000	\$5,000,000	to	\$7,500,000 .....	\$250,000
\$50,000	to \$100,000 .....	\$3,000	\$7,500,000	to	\$10,000,000 .....	\$400,000
\$100,000	to \$150,000 .....	\$5,000	\$10,000,000	to	\$15,000,000 .....	\$500,000
\$150,000	to \$250,000 .....	\$7,500	\$15,000,000	to	\$20,000,000 .....	\$600,000
\$250,000	to \$500,000 .....	\$12,500	\$20,000,000	to	\$25,000,000 .....	\$700,000
\$500,000	to \$1,000,000 .....	\$25,000	\$25,000,000	to	\$30,000,000 .....	\$800,000
\$1,000,000	to \$1,500,000 .....	\$50,000	\$30,000,000	to	\$35,000,000 .....	\$900,000
\$1,500,000	to \$2,000,000 .....	\$75,000	over		\$35,000,000 .....	\$1,000,000

Bank cashier's checks or properly certified checks accompanying proposals shall be made payable to the Treasurer, State of Illinois, when the state is awarding authority; the county treasurer, when a county is the awarding authority; or the city, village, or town treasurer, when a city, village, or town is the awarding authority.

If a combination bid is submitted, the proposal guaranties which accompany the individual proposals making up the combination will be considered as also covering the combination bid.

The amount of the proposal guaranty check is \_\_\_\_\_ \$( \_\_\_\_\_ ). If this proposal is accepted and the undersigned shall fail to execute a contract bond as required herein, it is hereby agreed that the amount of the proposal guaranty shall become the property of the State of Illinois, and shall be considered as payment of damages due to delay and other causes suffered by the State because of the failure to execute said contract and contract bond; otherwise, the bid bond shall become void or the proposal guaranty check shall be returned to the undersigned.

**Attach Cashier's Check or Certified Check Here**

In the event that one proposal guaranty check is intended to cover two or more proposals, the amount must be equal to the sum of the proposal guaranties which would be required for each individual proposal. If the guaranty check is placed in another proposal, state below where it may be found.

The proposal guaranty check will be found in the proposal for:

Item \_\_\_\_\_

Section No. \_\_\_\_\_

County \_\_\_\_\_

**Mark the proposal cover sheet as to the type of proposal guaranty submitted.**

BD 354 (Rev. 11/2001)

**RETURN WITH BID**

6. **COMBINATION BIDS.** The undersigned further agrees that if awarded the contract for the sections contained in the following combination, he/she will perform the work in accordance with the requirements of each individual proposal comprising the combination bid specified in the schedule below, and that the combination bid shall be prorated against each section in proportion to the bid submitted for the same. If an error is found to exist in the gross sum bid for one or more of the individual sections included in a combination, the combination bid shall be corrected as provided in the specifications.

**When a combination bid is submitted, the schedule below must be completed in each proposal comprising the combination.**

**If alternate bids are submitted for one or more of the sections comprising the combination, a combination bid must be submitted for each alternate.**

**Schedule of Combination Bids**

Combination No.	Sections Included in Combination	Combination Bid	
		Dollars	Cents

7. **SCHEDULE OF PRICES.** The undersigned bidder submits herewith, in accordance with the rules and instructions, a schedule of prices for the items of work for which bids are sought. The unit prices bid are in U.S. dollars and cents, and all extensions and summations have been made. The bidder understands that the quantities appearing in the bid schedule are approximate and are provided for the purpose of obtaining a gross sum for the comparison of bids. If there is an error in the extension of the unit prices, the unit prices shall govern. Payment to the contractor awarded the contract will be made only for actual quantities of work performed and accepted or materials furnished according to the contract. The scheduled quantities of work to be done and materials to be furnished may be increased, decreased or omitted as provided elsewhere in the contract.
8. **CERTIFICATE OF AUTHORITY.** The undersigned bidder, if a business organized under the laws of another State, assures the Department that it will furnish a copy of its certificate of authority to do business in the State of Illinois with the return of the executed contract and bond. Failure to furnish the certificate within the time provided for execution of an awarded contract may be cause for cancellation of the award and forfeiture of the proposal guaranty to the State.

STATE JOB # - C-98-303-07  
 PPS NBR - 0-05039-0000

COUNTY NAME	CODE	DIST	SECTION NUMBER	PROJECT NUMBER	ROUTE
MADISON	119	08	03-00026-00-PK/06-00026-01-MS	SBIL-TE-00D8/113/000	

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
XX003526	D I WAT MNF 8X6 RED	EACH	1.000 X				
XX003543	D I WAT MNF 8 45 BEND	EACH	1.000 X				
XX003803	SAN SEWER SERVICE 6	FOOT	43.000 X				
XX003949	CONSTRUCTION STAKING	L SUM	1.000 X				
XX005452	FENCE RAIL	FOOT	265.000 X				
XX007056	BUILDING	L SUM	1.000 X				
XX007058	FW PIPE 8 HDP SDR-11	FOOT	633.000 X				
XX007059	MAN (LEAKAGE TESTING)	EACH	2.000 X				
XX007060	MAN TA 4D WPF BL	EACH	2.000 X				
XX007061	OUTFALL STRUCTURE	EACH	1.000 X				
XX007062	REMOVE EXISTING CAP	EACH	1.000 X				
XX007063	REMOVE EXISTING PLUG	EACH	1.000 X				
XX007064	W MAIN TRACER WIRE	FOOT	340.000 X				
XX007065	WATER METER	EACH	1.000 X				
X0322587	CONSTRUCTION ACCESS	EACH	1.000 X				

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
X0323256	REM & REL FLAGPOLE	EACH	1.000 X				
X5640175	FIRE HYDRANT COMPLETE	EACH	1.000 X				
20200100	EARTH EXCAVATION	CU YD	14,798.000 X				
20800150	TRENCH BACKFILL	CU YD	24.300 X				
25000910	SEEDING CL 1 MOD	ACRE	3.200 X				
25001850	SEEDING CL 7 MOD	ACRE	0.200 X				
25100630	EROSION CONTR BLANKET	SQ YD	749.000 X				
25200100	SODDING	SQ YD	376.000 X				
28000250	TEMP EROS CONTR SEED	POUND	1,040.000 X				
28000300	TEMP DITCH CHECKS	EACH	1.000 X				
28000400	PERIMETER EROS BAR	FOOT	1,275.000 X				
28000500	INLET & PIPE PROTECT	EACH	2.000 X				
28100707	STONE DUMP RIP CL A4	SQ YD	35.000 X				
28200200	FILTER FABRIC	SQ YD	35.000 X				
30200650	PROCESS MOD SOIL 12	SQ YD	6,123.000 X				

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
30201500	LIME	TON	104.000 X	=			
31100100	SUB GRAN MAT A	TON	2,730.000 X	=			
40300100	BIT MATLS PR CT	GALLON	1,165.000 X	=			
40603085	HMA BC IL-19.0 N70	TON	492.000 X	=			
40603315	HMA SC "C" N70	TON	492.000 X	=			
42300400	PCC DRIVEWAY PAVT. 8	SQ YD	265.000 X	=			
42400100	PC CONC SIDEWALK 4	SQ FT	10,445.000 X	=			
42400800	DETECTABLE WARNINGS	SQ FT	48.000 X	=			
542A0229	P CUL CL A 1 24	FOOT	164.000 X	=			
54213660	PRC FLAR END SEC 15	EACH	1.000 X	=			
54213669	PRC FLAR END SEC 24	EACH	4.000 X	=			
54244405	FL INLT BX MED 542546	EACH	1.000 X	=			
550A0070	STORM SEW CL A 1 15	FOOT	87.000 X	=			
56200900	WATER SERV LINE 2 1/2	FOOT	42.000 X	=			
60600605	CONC CURB TB	FOOT	1,959.000 X	=			

ITEM NUMBER	PAY ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY	UNIT PRICE		TOTAL PRICE	
				DOLLARS	CENTS	DOLLARS	CTS
60614600	PAVED DITCH SPEC	FOOT	147.000 X				
67100100	MOBILIZATION	L SUM	1.000 X				
70101700	TRAF CONT & PROT	L SUM	1.000 X				
70102620	TR CONT & PROT 701501	L SUM	1.000 X				
72000100	SIGN PANEL T1	SQ FT	43.000 X				
73000100	WOOD SIN SUPPORT	FOOT	204.000 X				
78000100	THPL PVT MK LTR & SYM	SQ FT	98.000 X				
78000200	THPL PVT MK LINE 4	FOOT	3,596.000 X				
78000600	THPL PVT MK LINE 12	FOOT	5.000 X				
				TOTAL \$			

- NOTE:
1. EACH PAY ITEM SHOULD HAVE A UNIT PRICE AND A TOTAL PRICE.
  2. THE UNIT PRICE SHALL GOVERN IF NO TOTAL PRICE IS SHOWN OR IF THERE IS A DISCREPANCY BETWEEN THE PRODUCT OF THE UNIT PRICE MULTIPLIED BY THE QUANTITY.
  3. IF A UNIT PRICE IS OMITTED, THE TOTAL PRICE WILL BE DIVIDED BY THE QUANTITY IN ORDER TO ESTABLISH A UNIT PRICE.
  4. A BID MAY BE DECLARED UNACCEPTABLE IF NEITHER A UNIT PRICE NOR A TOTAL PRICE IS SHOWN.

## RETURN WITH BID

### STATE REQUIRED ETHICAL STANDARDS GOVERNING CONTRACT PROCUREMENT: ASSURANCES, CERTIFICATIONS AND DISCLOSURES

#### I. GENERAL

A. Article 50 of the Illinois Procurement Code establishes the duty of all State chief procurement officers, State purchasing officers, and their designees to maximize the value of the expenditure of public moneys in procuring goods, services, and contracts for the State of Illinois and to act in a manner that maintains the integrity and public trust of State government. In discharging this duty, they are charged by law to use all available information, reasonable efforts, and reasonable actions to protect, safeguard, and maintain the procurement process of the State of Illinois.

B. In order to comply with the provisions of Article 50 and to carry out the duty established therein, all bidders are to adhere to ethical standards established for the procurement process, and to make such assurances, disclosures and certifications required by law. By execution of the Proposal Signature Sheet, the bidder indicates that each of the mandated assurances has been read and understood, that each certification is made and understood, and that each disclosure requirement has been understood and completed.

C. In addition to all other remedies provided by law, failure to comply with any assurance, failure to make any disclosure or the making of a false certification shall be grounds for termination of the contract and the suspension or debarment of the bidder.

#### II. ASSURANCES

A. The assurances hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder. The Department may terminate the contract if it is later determined that the bidder rendered a false or erroneous assurance, and the surety providing the performance bond shall be responsible for the completion of the contract.

##### B. Felons

1. The Illinois Procurement Code provides:

Section 50-10. Felons. Unless otherwise provided, no person or business convicted of a felony shall do business with the State of Illinois or any state agency from the date of conviction until 5 years after the date of completion of the sentence for that felony, unless no person held responsible by a prosecutorial office for the facts upon which the conviction was based continues to have any involvement with the business.

2. The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-10.

##### C. Conflicts of Interest

1. The Illinois Procurement Code provides in pertinent part:

Section 50-13. Conflicts of Interest.

(a) Prohibition. It is unlawful for any person holding an elective office in this State, holding a seat in the General Assembly, or appointed to or employed in any of the offices or agencies of state government and who receives compensation for such employment in excess of 60% of the salary of the Governor of the State of Illinois, or who is an officer or employee of the Capital Development Board or the Illinois Toll Highway Authority, or who is the spouse or minor child of any such person to have or acquire any contract, or any direct pecuniary interest in any contract therein, whether for stationery, printing, paper, or any services, materials, or supplies, that will be wholly or partially satisfied by the payment of funds appropriated by the General Assembly of the State of Illinois or in any contract of the Capital Development Board or the Illinois Toll Highway authority.

(b) Interests. It is unlawful for any firm, partnership, association or corporation, in which any person listed in subsection (a) is entitled to receive (i) more than 7 1/2% of the total distributable income or (ii) an amount in excess of the salary of the Governor, to have or acquire any such contract or direct pecuniary interest therein.

(c) Combined interests. It is unlawful for any firm, partnership, association, or corporation, in which any person listed in subsection (a) together with his or her spouse or minor children is entitled to receive (i) more than 15%, in the aggregate, of the total distributable income or (ii) an amount in excess of 2 times the salary of the Governor, to have or acquire any such contract or direct pecuniary interest therein.

(d) Securities. Nothing in this Section invalidates the provisions of any bond or other security previously offered or to be offered for sale or sold by or for the State of Illinois.

(e) Prior interests. This Section does not affect the validity of any contract made between the State and an officer or employee of the State or member of the General Assembly, his or her spouse, minor child or any combination of those persons if that contract was in existence before his or her election or employment as an officer, member, or employee. The contract is voidable, however, if it cannot be completed within 365 days after the officer, member, or employee takes office or is employed.

The current salary of the Governor is \$171,000.00. Sixty percent of the salary is \$102,600.00.



## RETURN WITH BID

2. The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-13, or that an effective exemption has been issued by the Board of Ethics to any individual subject to the Section 50-13 prohibitions pursuant to the provisions of Section 50-20 of the Code and Executive Order Number 3 (1998). Information concerning the exemption process is available from the Department upon request.

### **D. Negotiations**

1. The Illinois Procurement Code provides in pertinent part:

Section 50-15. Negotiations.

(a) It is unlawful for any person employed in or on a continual contractual relationship with any of the offices or agencies of State government to participate in contract negotiations on behalf of that office or agency with any firm, partnership, association, or corporation with whom that person has a contract for future employment or is negotiating concerning possible future employment.

2. The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-15, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

### **E. Inducements**

1. The Illinois Procurement Code provides:

Section 50-25. Inducement. Any person who offers or pays any money or other valuable thing to any person to induce him or her not to bid for a State contract or as recompense for not having bid on a State contract is guilty of a Class 4 felony. Any person who accepts any money or other valuable thing for not bidding for a State contract or who withholds a bid in consideration of the promise for the payment of money or other valuable thing is guilty of a Class 4 felony.

2. The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-25, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

### **F. Revolving Door Prohibition**

1. The Illinois Procurement Code provides:

Section 50-30. Revolving door prohibition. Chief procurement officers, associate procurement officers, State purchasing officers, their designees whose principal duties are directly related to State procurement, and executive officers confirmed by the Senate are expressly prohibited for a period of 2 years after terminating an affected position from engaging in any procurement activity relating to the State agency most recently employing them in an affected position for a period of at least 6 months. The prohibition includes, but is not limited to: lobbying the procurement process; specifying; bidding; proposing bid, proposal, or contract documents; on their own behalf or on behalf of any firm, partnership, association, or corporation. This Section applies only to persons who terminate an affected position on or after January 15, 1999.

2. The bidder assures the Department that the award and execution of the contract would not cause a violation of Section 50-30, and that the bidder has no knowledge of any facts relevant to the kinds of acts prohibited therein.

### **G. Reporting Anticompetitive Practices**

1. The Illinois Procurement Code provides:

Section 50-40. Reporting anticompetitive practices. When, for any reason, any vendor, bidder, contractor, chief procurement officer, State purchasing officer, designee, elected official, or State employee suspects collusion or other anticompetitive practice among any bidders, offerors, contractors, proposers, or employees of the State, a notice of the relevant facts shall be transmitted to the Attorney General and the chief procurement officer.

2. The bidder assures the Department that it has not failed to report any relevant facts concerning the practices addressed in Section 50-40 which may involve the contract for which the bid is submitted.

### **H. Confidentiality**

1. The Illinois Procurement Code provides:

Section 50-45. Confidentiality. Any chief procurement officer, State purchasing officer, designee, or executive officer who willfully uses or allows the use of specifications, competitive bid documents, proprietary competitive information, proposals, contracts, or selection information to compromise the fairness or integrity of the procurement, bidding, or contract process shall be subject to immediate dismissal, regardless of the Personnel code, any contract, or any collective bargaining agreement, and may in addition be subject to criminal prosecution.

2. The bidder assures the Department that it has no knowledge of any fact relevant to the practices addressed in Section 50-45 which may involve the contract for which the bid is submitted.

## RETURN WITH BID

### **I. Insider Information**

1. The Illinois Procurement Act provides:

Section 50-50. Insider information. It is unlawful for any current or former elected or appointed State official or State employee to knowingly use confidential information available only by virtue of that office or employment for actual or anticipated gain for themselves or another person.

2. The bidder assures the Department that it has no knowledge of any facts relevant to the practices addressed in Section 50-50 which may involve the contract for which the bid is submitted.

### **III. CERTIFICATIONS**

**A.** The certifications hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder. The Department may terminate the contract if it is later determined that the bidder rendered a false or erroneous certification, and the surety providing the performance bond shall be responsible for completion of the contract.

#### **B. Bribery**

1. The Illinois Procurement Code provides:

Section 50-5. Bribery.

(a) Prohibition. No person or business shall be awarded a contract or subcontract under this Code who:

(1) has been convicted under the laws of Illinois or any other state of bribery or attempting to bribe an officer or employee of the State of Illinois or any other state in that officer's or employee's official capacity; or

(2) has made an admission of guilt of that conduct that is a matter of record but has not been prosecuted for that conduct.

(b) Businesses. No business shall be barred from contracting with any unit of State or local government as a result of a conviction under this Section of any employee or agent of the business if the employee or agent is no longer employed by the business and:

(1) the business has been finally adjudicated not guilty; or

(2) the business demonstrates to the governmental entity with which it seeks to contract, and that entity finds that the commission of the offense was not authorized, requested, commanded, or performed by a director, officer, or high managerial agent on behalf of the business as provided in paragraph (2) of subsection (a) of Section 5-4 of the Criminal Code of 1961.

(c) Conduct on behalf of business. For purposes of this Section, when an official, agent, or employee of a business committed the bribery or attempted bribery on behalf of the business and in accordance with the direction or authorization of a responsible official of the business, the business shall be chargeable with the conduct.

(d) Certification. Every bid submitted to and contract executed by the State shall contain a certification by the contractor that the contractor is not barred from being awarded a contract or subcontract under this Section. A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

2. The bidder certifies that it is not barred from being awarded a contract under Section 50.5.

#### **C. Educational Loan**

1. Section 3 of the Educational Loan Default Act provides:

§ 3. No State agency shall contract with an individual for goods or services if that individual is in default, as defined in Section 2 of this Act, on an educational loan. Any contract used by any State agency shall include a statement certifying that the individual is not in default on an educational loan as provided in this Section.

2. The bidder, if an individual as opposed to a corporation, partnership or other form of business organization, certifies that the bidder is not in default on an educational loan as provided in Section 3 of the Act.

#### **D. Bid-Rigging/Bid Rotating**

1. Section 33E-11 of the Criminal Code of 1961 provides:

§ 33E-11. (a) Every bid submitted to and public contract executed pursuant to such bid by the State or a unit of local government shall contain a certification by the prime contractor that the prime contractor is not barred from contracting with any unit of State or local government as a result of a violation of either Section 33E-3 or 33E-4 of this Article. The State and units of local government shall provide the appropriate forms for such certification.

## RETURN WITH BID

(b) A contractor who makes a false statement, material to the certification, commits a Class 3 felony.

A violation of Section 33E-3 would be represented by a conviction of the crime of bid-rigging which, in addition to Class 3 felony sentencing, provides that any person convicted of this offense or any similar offense of any state or the United States which contains the same elements as this offense shall be barred for 5 years from the date of conviction from contracting with any unit of State or local government. No corporation shall be barred from contracting with any unit of State or local government as a result of a conviction under this Section of any employee or agent of such corporation if the employee so convicted is no longer employed by the corporation and: (1) it has been finally adjudicated not guilty or (2) if it demonstrates to the governmental entity with which it seeks to contract and that entity finds that the commission of the offense was neither authorized, requested, commanded, nor performed by a director, officer or a high managerial agent in behalf of the corporation.

A violation of Section 33E-4 would be represented by a conviction of the crime of bid-rotating which, in addition to Class 2 felony sentencing, provides that any person convicted of this offense or any similar offense of any state or the United States which contains the same elements as this offense shall be permanently barred from contracting with any unit of State or local government. No corporation shall be barred from contracting with any unit of State or local government as a result of a conviction under this Section of any employee or agent of such corporation if the employee so convicted is no longer employed by the corporation and: (1) it has been finally adjudicated not guilty or (2) if it demonstrates to the governmental entity with which it seeks to contract and that entity finds that the commission of the offense was neither authorized, requested, commanded, nor performed by a director, officer or a high managerial agent in behalf of the corporation.

2. The bidder certifies that it is not barred from contracting with the Department by reason of a violation of either Section 33E-3 or Section 33E-4.

### **E. International Anti-Boycott**

1. Section 5 of the International Anti-Boycott Certification Act provides:

§ 5. State contracts. Every contract entered into by the State of Illinois for the manufacture, furnishing, or purchasing of supplies, material, or equipment or for the furnishing of work, labor, or services, in an amount exceeding the threshold for small purchases according to the purchasing laws of this State or \$10,000.00, whichever is less, shall contain certification, as a material condition of the contract, by which the contractor agrees that neither the contractor nor any substantially-owned affiliated company is participating or shall participate in an international boycott in violation of the provisions of the U.S. Export Administration Act of 1979 or the regulations of the U.S. Department of Commerce promulgated under that Act.

2. The bidder makes the certification set forth in Section 5 of the Act.

### **F. Drug Free Workplace**

1. The Illinois "Drug Free Workplace Act" applies to this contract and it is necessary to comply with the provisions of the "Act" if the contractor is a corporation, partnership, or other entity (including a sole proprietorship) which has 25 or more employees.

2. The bidder certifies that if awarded a contract in excess of \$5,000 it will provide a drug free workplace by:

(a) Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance, including cannabis, is prohibited in the contractor's workplace; specifying the actions that will be taken against employees for violations of such prohibition; and notifying the employee that, as a condition of employment on such contract, the employee shall abide by the terms of the statement, and notify the employer of any criminal drug statute conviction for a violation occurring in the workplace no later than five (5) days after such conviction.

(b) Establishing a drug free awareness program to inform employees about the dangers of drug abuse in the workplace; the contractor's policy of maintaining a drug free workplace; any available drug counseling, rehabilitation, and employee assistance programs; and the penalties that may be imposed upon employees for drug violations.

(c) Providing a copy of the statement required by subparagraph (1) to each employee engaged in the performance of the contract and to post the statement in a prominent place in the workplace.

(d) Notifying the Department within ten (10) days after receiving notice from an employee or otherwise receiving actual notice of the conviction of an employee for a violation of any criminal drug statute occurring in the workplace.

(e) Imposing or requiring, within 30 days after receiving notice from an employee of a conviction or actual notice of such a conviction, an appropriate personnel action, up to and including termination, or the satisfactory participation in a drug abuse assistance or rehabilitation program approved by a federal, state or local health, law enforcement or other appropriate agency.

(f) Assisting employees in selecting a course of action in the event drug counseling, treatment, and rehabilitation is required and indicating that a trained referral team is in place.

(g) Making a good faith effort to continue to maintain a drug free workplace through implementation of the actions and efforts stated in this certification.

**G. Debt Delinquency**

1. The Illinois Procurement Code provides:

Section 50-11 and 50-12. Debt Delinquency.

The contractor or bidder certifies that it, or any affiliate, is not barred from being awarded a contract under 30 ILCS 500. Section 50-11 prohibits a person from entering into a contract with a State agency if it knows or should know that it, or any affiliate, is delinquent in the payment of any debt to the State as defined by the Debt Collection Board. Section 50-12 prohibits a person from entering into a contract with a State agency if it, or any affiliate, has failed to collect and remit Illinois Use Tax on all sales of tangible personal property into the State of Illinois in accordance with the provisions of the Illinois Use Tax Act. The contractor further acknowledges that the contracting State agency may declare the contract void if this certification is false or if the contractor, or any affiliate, is determined to be delinquent in the payment of any debt to the State during the term of the contract.

**H. Sarbanes-Oxley Act of 2002**

1. The Illinois Procurement Code, Section 50-60(c), provides:

The contractor certifies in accordance with 30 ILCS 500/50-10.5 that no officer, director, partner or other managerial agent of the contracting business has been convicted of a felony under the Sarbanes-Oxley Act of 2002 or a Class 3 or Class 2 felony under the Illinois Securities Law of 1953 for a period of five years prior to the date of the bid or contract. The contractor acknowledges that the contracting agency shall declare the contract void if this certification is false.

**I. Addenda**

The contractor or bidder certifies that all relevant addenda have been incorporated in to this contract. Failure to do so may cause the bid to be declared unacceptable.

**J. Section 42 of the Environmental Protection Act**

The contractor certifies in accordance with 30 ILCS 500/50-12 that the bidder or contractor is not barred from being awarded a contract under this Section which prohibits the bidding on or entering into contracts with the State of Illinois or a State agency by a person or business found by a court or the Pollution Control Board to have committed a willful or knowing violation of Section 42 of the Environmental Protection Act for a period of five years from the date of the order. The contractor acknowledges that the contracting agency may declare the contract void if this certification is false.

**K. Apprenticeship and Training Certification (Does not apply to federal aid projects)**

In accordance with the provisions of Section 30-22 (6) of the Illinois Procurement Code, the bidder certifies that it is a participant, either as an individual or as part of a group program, in the approved apprenticeship and training programs applicable to each type of work or craft that the bidder will perform with its own forces. The bidder further certifies for work that will be performed by subcontract that each of its subcontractors submitted for approval either (a) is, at the time of such bid, participating in an approved, applicable apprenticeship and training program; or (b) will, prior to commencement of performance of work pursuant to this contract, begin participation in an approved apprenticeship and training program applicable to the work of the subcontract. The Department, at any time before or after award, may require the production of a copy of each applicable Certificate of Registration issued by the United States Department of Labor evidencing such participation by the contractor and any or all of its subcontractors. Applicable apprenticeship and training programs are those that have been approved and registered with the United States Department of Labor. The bidder shall list in the space below, the official name of the program sponsor holding the Certificate of Registration for all of the types of work or crafts in which the bidder is a participant and that will be performed with the bidder's forces. Types of work or craft work that will be subcontracted shall be included and listed as subcontract work. The list shall also indicate any type of work or craft job category that does not have an applicable apprenticeship or training program. **The bidder is responsible for making a complete report and shall make certain that each type of work or craft job category that will be utilized on the project as reported on the Construction Employee Workforce Projection (Form BC-1256) and returned with the bid is accounted for and listed.**

**NA - FEDERAL**

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The requirements of this certification and disclosure are a material part of the contract, and the contractor shall require this certification provision to be included in all approved subcontracts. In order to fulfill this requirement, it shall not be necessary that an applicable program sponsor be currently taking or that it will take applications for apprenticeship, training or employment during the performance of the work of this contract.

**L. Executive Order Number 1 (2007) Regarding Lobbying on Government Procurements**

The bidder hereby warrants and certifies that they have complied and will comply with the requirements set forth in this Order. The requirements of this warrant and certification are a material part of the contract, and the contractor shall require this warrant and certification provision to be included in all approved subcontracts.

**M. Disclosure of Business Operations in Iran**

Public Act 95-0616 provides that each bid, offer, or proposal submitted for a State contract shall include a disclosure of whether or not the Company acting as the bidder, offeror, or proposing entity, or any of its corporate parents or subsidiaries, within the 24 months before submission of the bid, offer, or proposal had business operations that involved contracts with or provision of supplies or services to the Government of Iran, companies in which the Government of Iran has any direct or indirect equity share, consortiums or projects commissioned by the Government of Iran, or companies involved in consortiums or projects commissioned by the Government of Iran and either of the following conditions apply:

- (1) More than 10% of the Company's revenues produced in or assets located in Iran involve oil-related activities or mineral-extraction activities; less than 75% of the Company's revenues produced in or assets located in Iran involve contracts with or provision of oil-related or mineral-extraction products or services to the Government of Iran or a project or consortium created exclusively by that government; and the Company has failed to take substantial action.
- (2) The Company has, on or after August 5, 1996, made an investment of \$20 million or more, or any combination of investments of at least \$10 million each that in the aggregate equals or exceeds \$20 million in any 12-month period, which directly or significantly contributes to the enhancement of Iran's ability to develop petroleum resources of Iran.

The terms "Business operations", "Company", "Mineral-extraction activities", "Oil-related activities", "Petroleum resources", and "Substantial action" are all defined in the Act.

Failure to make the disclosure required by the Act shall cause the bid, offer or proposal to be considered not responsive. The disclosure will be considered when evaluating the bid, offer, or proposal or awarding the contract. The name of each Company disclosed as doing business or having done business in Iran will be provided to the State Comptroller.

Check the appropriate statement:

Company has no business operations in Iran to disclose.

Company has business operations in Iran as disclosed the attached document.

## TO BE RETURNED WITH BID

### IV. DISCLOSURES

A. The disclosures hereinafter made by the bidder are each a material representation of fact upon which reliance is placed should the Department enter into the contract with the bidder. The Department may terminate the contract if it is later determined that the bidder rendered a false or erroneous disclosure, and the surety providing the performance bond shall be responsible for completion of the contract.

#### B. Financial Interests and Conflicts of Interest

1. Section 50-35 of the Illinois Procurement Code provides that all bids of more than \$10,000 shall be accompanied by disclosure of the financial interests of the bidder. This disclosed information for the successful bidder, will be maintained as public information subject to release by request pursuant to the Freedom of Information Act.

The financial interests to be disclosed shall include ownership or distributive income share that is in excess of 5%, or an amount greater than 60% of the annual salary of the Governor, of the bidding entity or its parent entity, whichever is less, unless the contractor or bidder is a publicly traded entity subject to Federal 10K reporting, in which case it may submit its 10K disclosure in place of the prescribed disclosure. If a bidder is a privately held entity that is exempt from Federal 10K reporting, but has more than 400 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. The disclosure shall include the names, addresses, and dollar or proportionate share of ownership of each person making the disclosure, their instrument of ownership or beneficial relationship, and notice of any potential conflict of interest resulting from the current ownership or beneficial interest of each person making the disclosure having any of the relationships identified in Section 50-35 and on the disclosure form.

In addition, all disclosures shall indicate any other current or pending contracts, proposals, leases, or other ongoing procurement relationships the bidding entity has with any other unit of state government and shall clearly identify the unit and the contract, proposal, lease, or other relationship.

2. Disclosure Forms. Disclosure Form A is attached for use concerning the individuals meeting the above ownership or distributive share requirements. Subject individuals should be covered each by one form. In addition, a second form (Disclosure Form B) provides for the disclosure of current or pending procurement relationships with other (non-IDOT) state agencies. **The forms must be included with each bid or incorporated by reference.**

#### C. Disclosure Form Instructions

##### Form A: For bidders that have previously submitted the information requested in Form A

The Department has retained the Form A disclosures submitted by all bidders responding to these requirements for the April 24, 1998 or any subsequent letting conducted by the Department. The bidder has the option of submitting the information again or the bidder may check the following certification statement indicating that the information previously submitted by the bidder is, as of the date of submission, current and accurate. Before checking this certification, the bidder should carefully review its prior submissions to ensure the Certification is correct. If the Bidder checks the Certification, the Bidder should proceed to Form B instructions.

### CERTIFICATION STATEMENT

**I have determined that the Form A disclosure information previously submitted is current and accurate, and all forms are hereby incorporated by reference in this bid. Any necessary additional forms or amendments to previously submitted forms are attached to this bid.**

\_\_\_\_\_  
(Bidding Company)



\_\_\_\_\_  
Signature of Authorized Representative

\_\_\_\_\_  
Date

**Form A: For bidders who have NOT previously submitted the information requested in Form A**

If the bidder is a publicly traded entity subject to Federal 10K reporting, the 10K Report may be submitted to meet the requirements of Form A. If a bidder is a privately held entity that is exempt from Federal 10K reporting, but has more than 400 shareholders, it may submit the information that Federal 10K companies are required to report, and list the names of any person or entity holding any ownership share that is in excess of 5%. If a bidder is not subject to Federal 10K reporting, the bidder must determine if any individuals are required by law to complete a financial disclosure form. To do this, the bidder should answer each of the following questions. A "YES" answer indicates Form A must be completed. If the answer to each of the following questions is "NO", then the NOT APPLICABLE STATEMENT on the second page of Form A must be signed and dated by a person that is authorized to execute contracts for the bidding company. Note: These questions are for assistance only and are not required to be completed.

1. Does anyone in your organization have a direct or beneficial ownership share of greater than 5% of the bidding entity or parent entity? YES \_\_\_ NO \_\_\_
2. Does anyone in your organization have a direct or beneficial ownership share of less than 5%, but which has a value greater than \$102,600.00? YES \_\_\_ NO \_\_\_
3. Does anyone in your organization receive more than \$102,600.00 of the bidding entity's or parent entity's distributive income? (Note: Distributive income is, for these purposes, any type of distribution of profits. An annual salary is not distributive income.) YES \_\_\_ NO \_\_\_
4. Does anyone in your organization receive greater than 5% of the bidding entity's or parent entity's total distributive income, but which is less than \$102,600.00? YES \_\_\_ NO \_\_\_  
(Note: Only one set of forms needs to be completed per person per bid even if a specific individual would require a yes answer to more than one question.)

A "YES" answer to any of these questions requires the completion of Form A. The bidder must determine each individual in the bidding entity or the bidding entity's parent company that would cause the questions to be answered "Yes". Each form must be signed and dated by a person that is authorized to execute contracts for your organization. **Photocopied or stamped signatures are not acceptable.** The person signing can be, but does not have to be, the person for which the form is being completed. The bidder is responsible for the accuracy of any information provided.

If the answer to each of the above questions is "NO", then the NOT APPLICABLE STATEMENT on page 2 of Form A must be signed and dated by a person that is authorized to execute contracts for your company.

**Form B: Identifying Other Contracts & Procurement Related Information** Disclosure Form B must be completed for each bid submitted by the bidding entity. Note: *Checking the NOT APPLICABLE STATEMENT on Form A does not allow the bidder to ignore Form B. Form B must be completed, checked, and dated or the bidder may be considered nonresponsive and the bid will not be accepted.*

The Bidder shall identify, by checking Yes or No on Form B, whether it has any pending contracts (including leases), bids, proposals, or other ongoing procurement relationship with any other (non-IDOT) State of Illinois agency. If "No" is checked, the bidder only needs to complete the check box on the bottom of Form B. If "Yes" is checked, the bidder must do one of the following:

Option I: If the bidder did not submit an Affidavit of Availability to obtain authorization to bid, the bidder must list all non-IDOT State of Illinois agency pending contracts, leases, bids, proposals, and other ongoing procurement relationships. These items may be listed on Form B or on an attached sheet(s). Do not include IDOT contracts. Contracts with cities, counties, villages, etc. are not considered State of Illinois agency contracts and are not to be included. Contracts with other State of Illinois agencies such as the Department of Natural Resources or the Capital Development Board must be included. Bidders who submit Affidavits of Availability are suggested to use Option II.

Option II: If the bidder is required and has submitted an Affidavit of Availability in order to obtain authorization to bid, the bidder may write or type "See Affidavit of Availability" which indicates that the Affidavit of Availability is incorporated by reference and includes all non-IDOT State of Illinois agency pending contracts, leases, bids, proposals, and other ongoing procurement relationships. For any contracts that are not covered by the Affidavit of Availability, the bidder must identify them on Form B or on an attached sheet(s). These might be such things as leases.

**D. Bidders Submitting More Than One Bid**

Bidders submitting multiple bids may submit one set of forms consisting of all required Form A disclosures and one Form B for use with all bids. Please indicate in the space provided below the bid item that contains the original disclosure forms and the bid items which incorporate the forms by reference.

- The bid submitted for letting item \_\_\_\_\_ contains the Form A disclosures or Certification Statement and the Form B disclosures. The following letting items incorporate the said forms by reference:

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ILLINOIS DEPARTMENT OF TRANSPORTATION

Form A Financial Information & Potential Conflicts of Interest Disclosure

Contractor Name, Legal Address, City, State, Zip, Telephone Number, Email Address, Fax Number (if available)

Disclosure of the information contained in this Form is required by the Section 50-35 of the Illinois Procurement Code (30 ILCS 500). Vendors desiring to enter into a contract with the State of Illinois must disclose the financial information and potential conflict of interest information as specified in this Disclosure Form. This information shall become part of the publicly available contract file. This Form A must be completed for bids in excess of \$10,000, and for all open-ended contracts. A publicly traded company may submit a 10K disclosure (or equivalent if applicable) in satisfaction of the requirements set forth in Form A. See Disclosure Form Instructions.

DISCLOSURE OF FINANCIAL INFORMATION

1. Disclosure of Financial Information. The individual named below has an interest in the BIDDER (or its parent) in terms of ownership or distributive income share in excess of 5%, or an interest which has a value of more than \$102,600.00 (60% of the Governor's salary as of 7/1/07). (Make copies of this form as necessary and attach a separate Disclosure Form A for each individual meeting these requirements)

FOR INDIVIDUAL (type or print information)

NAME:

ADDRESS

Type of ownership/distributable income share:

stock sole proprietorship Partnership other: (explain on separate sheet): % or \$ value of ownership/distributable income share:

2. Disclosure of Potential Conflicts of Interest. Check "Yes" or "No" to indicate which, if any, of the following potential conflict of interest relationships apply. If the answer to any question is "Yes", please attach additional pages and describe.

(a) State employment, currently or in the previous 3 years, including contractual employment of services. Yes \_\_\_ No \_\_\_

If your answer is yes, please answer each of the following questions.

- 1. Are you currently an officer or employee of either the Capitol Development Board or the Illinois Toll Highway Authority? Yes \_\_\_ No \_\_\_
2. Are you currently appointed to or employed by any agency of the State of Illinois? If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds \$102,600.00, (60% of the Governor's salary as of 7/1/07) provide the name the State agency for which you are employed and your annual salary.



**RETURN WITH BID/OFFER**

- 3. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds \$102,600.00, (60% of the Governor's salary as of 7/1/07) are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of the salary of the Governor? Yes \_\_\_ No \_\_\_
  
- 4. If you are currently appointed to or employed by any agency of the State of Illinois, and your annual salary exceeds \$102,600.00, (60% of the Governor's salary as of 7/1/07) are you and your spouse or minor children entitled to receive (i) more than 15% in aggregate of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of 2 times the salary of the Governor? Yes \_\_\_ No \_\_\_

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(b) State employment of spouse, father, mother, son, or daughter, including contractual employment for services in the previous 2 years.

Yes \_\_\_ No \_\_\_

If your answer is yes, please answer each of the following questions.

- 1. Is your spouse or any minor children currently an officer or employee of the Capitol Development Board or the Illinois Toll Highway Authority? Yes \_\_\_ No \_\_\_
  
- 2. Is your spouse or any minor children currently appointed to or employed by any agency of the State of Illinois? If your spouse or minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds \$102,600.00, (60% of the Governor's salary as of 7/1/07) provide the name of the spouse and/or minor children, the name of the State agency for which he/she is employed and his/her annual salary. \_\_\_\_\_

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- 3. If your spouse or any minor children is/are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds \$102,600.00, (60% of the salary of the Governor as of 7/1/07) are you entitled to receive (i) more than 7 1/2% of the total distributable income of your firm, partnership, association or corporation, or (ii) an amount in excess of the salary of the Governor? Yes \_\_\_ No \_\_\_
  
- 4. If your spouse or any minor children are currently appointed to or employed by any agency of the State of Illinois, and his/her annual salary exceeds \$102,600.00, (60% of the Governor's salary as of 7/1/07) are you and your spouse or any minor children entitled to receive (i) more than 15% in the aggregate of the total distributable income from your firm, partnership, association or corporation, or (ii) an amount in excess of 2 times the salary of the Governor? Yes \_\_\_ No \_\_\_

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(c) Elective status; the holding of elective office of the State of Illinois, the government of the United States, any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois currently or in the previous 3 years. Yes \_\_\_ No \_\_\_

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(d) Relationship to anyone holding elective office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes \_\_\_ No \_\_\_

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(e) Appointive office; the holding of any appointive government office of the State of Illinois, the United State of America, or any unit of local government authorized by the Constitution of the State of Illinois or the statutes of the State of Illinois, which office entitles the holder to compensation in excess of the expenses incurred in the discharge of that office currently or in the previous 3 years. Yes \_\_\_ No \_\_\_

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(f) Relationship to anyone holding appointive office currently or in the previous 2 years; spouse, father, mother, son, or daughter. Yes \_\_\_ No \_\_\_

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(g) Employment, currently or in the previous 3 years, as or by any registered lobbyist of the State government. Yes \_\_\_ No \_\_\_

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(h) Relationship to anyone who is or was a registered lobbyist in the previous 2 years; spouse, father, mother, son, or daughter. Yes \_\_\_ No \_\_\_

(i) Compensated employment, currently or in the previous 3 years, by any registered election or reelection committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections. Yes \_\_\_ No \_\_\_

(j) Relationship to anyone; spouse, father, mother, son, or daughter; who was a compensated employee in the last 2 years by any registered election or re-election committee registered with the Secretary of State or any county clerk of the State of Illinois, or any political action committee registered with either the Secretary of State or the Federal Board of Elections. Yes \_\_\_ No \_\_\_

**APPLICABLE STATEMENT**

**This Disclosure Form A is submitted on behalf of the INDIVIDUAL named on previous page.**

Completed by:  \_\_\_\_\_  
Signature of Individual or Authorized Representative Date

**NOT APPLICABLE STATEMENT**

**I have determined that no individuals associated with this organization meet the criteria that would require the completion of this Form A.**

**This Disclosure Form A is submitted on behalf of the CONTRACTOR listed on the previous page.**

\_\_\_\_\_  
Signature of Authorized Representative Date

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**ILLINOIS DEPARTMENT  
OF TRANSPORTATION**

**Form B  
Other Contracts &  
Procurement Related Information  
Disclosure**

Contractor Name		
Legal Address		
City, State, Zip		
Telephone Number	Email Address	Fax Number (if available)

Disclosure of the information contained in this Form is required by the Section 50-35 of the Illinois Procurement Act (30 ILCS 500). This information shall become part of the publicly available contract file. This Form B must be completed for bids in excess of \$10,000, and for all open-ended contracts.

**DISCLOSURE OF OTHER CONTRACTS AND PROCUREMENT RELATED INFORMATION**

**1. Identifying Other Contracts & Procurement Related Information.** The BIDDER shall identify whether it has any pending contracts (including leases), bids, proposals, or other ongoing procurement relationship with any other State of Illinois agency: Yes \_\_\_ No \_\_\_

If "No" is checked, the bidder only needs to complete the signature box on the bottom of this page.

**2. If "Yes" is checked.** Identify each such relationship by showing State of Illinois agency name and other descriptive information such as bid or project number (attach additional pages as necessary). SEE DISCLOSURE FORM INSTRUCTIONS:

**THE FOLLOWING STATEMENT MUST BE CHECKED**

<input type="checkbox"/>	_____	_____
	Signature of Authorized Representative	Date

## **RETURN WITH BID**

### **SPECIAL NOTICE TO CONTRACTORS**

The following requirements of the Illinois Department of Human Rights' Rules and Regulations are applicable to bidders on all construction contracts advertised by the Illinois Department of Transportation:

#### **CONSTRUCTION EMPLOYEE UTILIZATION PROJECTION**

- (a) All bidders on construction contracts shall complete and submit, along with and as part of their bids, a Bidder's Employee Utilization Form (Form BC-1256) setting forth a projection and breakdown of the total workforce intended to be hired and/or allocated to such contract work by the bidder including a projection of minority and female employee utilization in all job classifications on the contract project.
- (b) The Department of Transportation shall review the Employee Utilization Form, and workforce projections contained therein, of the contract awardee to determine if such projections reflect an underutilization of minority persons and/or women in any job classification in accordance with the Equal Employment Opportunity Clause and Section 7.2 of the Illinois Department of Human Rights' Rules and Regulations for Public Contracts adopted as amended on September 17, 1980. If it is determined that the contract awardee's projections reflect an underutilization of minority persons and/or women in any job classification, it shall be advised in writing of the manner in which it is underutilizing and such awardee shall be considered to be in breach of the contract unless, prior to commencement of work on the contract project, it submits revised satisfactory projections or an acceptable written affirmative action plan to correct such underutilization including a specific timetable geared to the completion stages of the contract.
- (c) The Department of Transportation shall provide to the Department of Human Rights a copy of the contract awardee's Employee Utilization Form, a copy of any required written affirmative action plan, and any written correspondence related thereto. The Department of Human Rights may review and revise any action taken by the Department of Transportation with respect to these requirements.



**RETURN WITH BID**

**Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Project SBIL-TE-00D8(113)  
Route  
District 8 Construction Funds**

**PART II. WORKFORCE PROJECTION - continued**

- B. Included in "Total Employees" under Table A is the total number of **new hires** that would be employed in the event the undersigned bidder is awarded this contract.

The undersigned bidder projects that: (number) \_\_\_\_\_ new hires would be recruited from the area in which the contract project is located; and/or (number) \_\_\_\_\_ new hires would be recruited from the area in which the bidder's principal office or base of operation is located.

- C. Included in "Total Employees" under Table A is a projection of numbers of persons to be employed directly by the undersigned bidder as well as a projection of numbers of persons to be employed by subcontractors.

The undersigned bidder estimates that (number) \_\_\_\_\_ persons will be directly employed by the prime contractor and that (number) \_\_\_\_\_ persons will be employed by subcontractors.

**PART III. AFFIRMATIVE ACTION PLAN**

- A. The undersigned bidder understands and agrees that in the event the foregoing minority and female employee utilization projection included under **PART II** is determined to be an underutilization of minority persons or women in any job category, and in the event that the undersigned bidder is awarded this contract, he/she will, prior to commencement of work, develop and submit a written Affirmative Action Plan including a specific timetable (geared to the completion stages of the contract) whereby deficiencies in minority and/or female employee utilization are corrected. Such Affirmative Action Plan will be subject to approval by the contracting agency and the **Department of Human Rights**.
- B. The undersigned bidder understands and agrees that the minority and female employee utilization projection submitted herein, and the goals and timetable included under an Affirmative Action Plan if required, are deemed to be part of the contract specifications.

Company \_\_\_\_\_ Telephone Number \_\_\_\_\_

Address \_\_\_\_\_

**NOTICE REGARDING SIGNATURE**

The Bidder's signature on the Proposal Signature Sheet will constitute the signing of this form. The following signature block needs to be completed only if revisions are required.

Signature:  \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

Instructions: All tables must include subcontractor personnel in addition to prime contractor personnel.

Table A - Include both the number of employees that would be hired to perform the contract work and the total number currently employed (Table B) that will be allocated to contract work, and include all apprentices and on-the-job trainees. The "Total Employees" column should include all employees including all minorities, apprentices and on-the-job trainees to be employed on the contract work.

Table B - Include all employees currently employed that will be allocated to the contract work including any apprentices and on-the-job trainees currently employed.

Table C - Indicate the racial breakdown of the total apprentices and on-the-job trainees shown in Table A.

## RETURN WITH BID

### **ADDITIONAL FEDERAL REQUIREMENTS**

In addition to the Required Contract Provisions for Federal-Aid Construction Contracts (FHWA 1273), all bidders make the following certifications.

- A. By the execution of this proposal, the signing bidder certifies that the bidding entity has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action, in restraint of free competitive bidding in connection with the submitted bid. This statement made by the undersigned bidder is true and correct under penalty of perjury under the laws of the United States.
- B. **CERTIFICATION, EQUAL EMPLOYMENT OPPORTUNITY:**
1. Have you participated in any previous contracts or subcontracts subject to the equal opportunity clause. YES \_\_\_\_\_ NO \_\_\_\_\_
  2. If answer to #1 is yes, have you filed with the Joint Reporting Committee, the Director of OFCC, any Federal agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements of those organizations? YES \_\_\_\_\_ NO \_\_\_\_\_

**RETURN WITH BID**

**Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Project SBIL-TE-00D8(113)  
Route  
District 8 Construction Funds**

PROPOSAL SIGNATURE SHEET

The undersigned bidder hereby makes and submits this bid on the subject Proposal, thereby assuring the Department that all requirements of the Invitation for Bids and rules of the Department have been met, that there is no misunderstanding of the requirements of paragraph 3 of this Proposal, and that the contract will be executed in accordance with the rules of the Department if an award is made on this bid.

(IF AN INDIVIDUAL) Firm Name \_\_\_\_\_  
Signature of Owner \_\_\_\_\_  
Business Address \_\_\_\_\_  
\_\_\_\_\_

(IF A CO-PARTNERSHIP) Firm Name \_\_\_\_\_  
By \_\_\_\_\_  
Business Address \_\_\_\_\_  
Name and Address of All Members of the Firm: \_\_\_\_\_  
\_\_\_\_\_

(IF A CORPORATION) Corporate Name \_\_\_\_\_  
By \_\_\_\_\_  
Signature of Authorized Representative \_\_\_\_\_  
Typed or printed name and title of Authorized Representative \_\_\_\_\_

(IF A JOINT VENTURE, USE THIS SECTION FOR THE MANAGING PARTY AND THE SECOND PARTY SHOULD SIGN BELOW) Attest \_\_\_\_\_  
Signature \_\_\_\_\_  
Business Address \_\_\_\_\_

(IF A JOINT VENTURE) Corporate Name \_\_\_\_\_  
By \_\_\_\_\_  
Signature of Authorized Representative \_\_\_\_\_  
Typed or printed name and title of Authorized Representative \_\_\_\_\_

Attest \_\_\_\_\_  
Signature \_\_\_\_\_  
Business Address \_\_\_\_\_

If more than two parties are in the joint venture, please attach an additional signature sheet.





Return with Bid

Division of Highways
Proposal Bid Bond
(Effective November 1, 1992)

Item No. \_\_\_\_\_

Letting Date \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, That We \_\_\_\_\_

as PRINCIPAL, and \_\_\_\_\_

\_\_\_\_\_ as SURETY, are held jointly, severally and firmly bound unto the STATE OF ILLINOIS in the penal sum of 5 percent of the total bid price, or for the amount specified in Article 102.09 of the "Standard Specifications for Road and Bridge Construction" in effect on the date of invitation for bids, whichever is the lesser sum, well and truly to be paid unto said STATE OF ILLINOIS, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns.

THE CONDITION OF THE FOREGOING OBLIGATION IS SUCH, that whereas, the PRINCIPAL has submitted a bid proposal to the STATE OF ILLINOIS, acting through the Department of Transportation, for the improvement designated by the Transportation Bulletin Item Number and Letting Date indicated above.

NOW, THEREFORE, if the Department shall accept the bid proposal of the PRINCIPAL; and if the PRINCIPAL shall, within the time and as specified in the bidding and contract documents, submit a DBE Utilization Plan that is accepted and approved by the Department; and if, after award by the Department, the PRINCIPAL shall enter into a contract in accordance with the terms of the bidding and contract documents including evidence of the required insurance coverages and providing such bond as specified 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 if, in the event of the failure of the PRINCIPAL to make the required DBE submission or to enter into such contract and to give the specified bond, the PRINCIPAL pays to the Department the difference not to exceed the penalty hereof between the amount specified in the bid proposal and such larger amount for which the Department may contract with another party to perform the work covered by said bid proposal, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

IN THE EVENT the Department determines the PRINCIPAL has failed to comply with any requirement as set forth in the preceding paragraph, then Surety shall pay the penal sum to the Department within fifteen (15) days of written demand therefor. If Surety does not make full payment within such period of time, the Department may bring an action to collect the amount owed. Surety is liable to the Department for all its expenses, including attorney's fees, incurred in any litigation in which it prevails either in whole or in part.

In TESTIMONY WHEREOF, the said PRINCIPAL and the said SURETY have caused this instrument to be signed by

their respective officers this \_\_\_\_\_ day of \_\_\_\_\_ A.D., \_\_\_\_\_ .

PRINCIPAL

\_\_\_\_\_  
(Company Name)

\_\_\_\_\_  
(Company Name)

By: \_\_\_\_\_  
(Signature & Title)

By: \_\_\_\_\_  
(Signature of Attorney-in-Fact)

Notary Certification for Principal and Surety

STATE OF ILLINOIS,

County of \_\_\_\_\_

I, \_\_\_\_\_, a Notary Public in and for said County, do hereby certify that

\_\_\_\_\_ and \_\_\_\_\_  
(Insert names of individuals signing on behalf of PRINCIPAL & SURETY)

who are each personally known to me to be the same persons whose names are subscribed to the foregoing instrument on behalf of PRINCIPAL and SURETY, appeared before me this day in person and acknowledged respectively, that they signed and delivered said instrument as their free and voluntary act for the uses and purposes therein set forth.

Given under my hand and notarial seal this \_\_\_\_\_ day of \_\_\_\_\_ A.D. \_\_\_\_\_

My commission expires \_\_\_\_\_

Notary Public

In lieu of completing the above section of the Proposal Bid Form, the Principal may file an Electronic Bid Bond. By signing the proposal and marking the check box next to the Signature and Title line below, the Principal is ensuring the identified electronic bid bond has been executed and the Principal and Surety are firmly bound unto the State of Illinois under the conditions of the bid bond as shown above.



Electronic Bid Bond ID# \_\_\_\_\_

Company / Bidder Name \_\_\_\_\_

Signature and Title \_\_\_\_\_

# PROPOSAL ENVELOPE



## PROPOSALS

for construction work advertised for bids by the Illinois Department of Transportation

Item No.	Item No.	Item No.

Submitted By:

Name:
Address:
Phone No.

Bidders should use an IDOT proposal envelope or affix this form to the front of a 10" x 13" envelope for the submittal of bids. If proposals are mailed, they should be enclosed in a second or outer envelope addressed to:

Engineer of Design and Environment - Room 326  
Illinois Department of Transportation  
2300 South Dirksen Parkway  
Springfield, Illinois 62764

### **NOTICE**

**Individual bids, including Bid Bond and/or supplemental information if required, should be securely stapled.**

# CONTRACTOR OFFICE COPY OF CONTRACT SPECIFICATIONS

## NOTICE

None of the following material needs to be returned with the bid package unless the special provisions require documentation and/or other information to be submitted.

**Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Project SBIL-TE-00D8(113)  
Route  
District 8 Construction Funds**



**Illinois Department of Transportation**



## NOTICE TO BIDDERS

- 1. TIME AND PLACE OF OPENING BIDS.** Sealed proposals for the improvement described herein will be received by the Department of Transportation at the Harry R. Hanley Building, 2300 South Dirksen Parkway, in Springfield, Illinois until 10:00 o'clock a.m., March 7, 2008. All bids will be gathered, sorted, publicly opened and read in the auditorium at the Department of Transportation's Harry R. Hanley Building shortly after the 10:00 a.m. cut off time.
- 2. DESCRIPTION OF WORK.** The proposed improvement is identified and advertised for bids in the Invitation for Bids as:

**Contract No. 97331  
MADISON County  
Section 03-00026-00-PK & 06-00026-01-MS (Hartford)  
Project SBIL-TE-00D8(113)  
Route  
District 8 Construction Funds**

**This project consists of the construction of a welcome center, restrooms, parking lot, sidewalks, water and sanitary sewer service lines and drainage appurtenances, located adjacent to Confluence Tower Drive, South of West Piasa lane, in the village of Hartford.**

- 3. INSTRUCTIONS TO BIDDERS.** (a) This Notice, the invitation for bids, proposal and letter of award shall, together with all other documents in accordance with Article 101.09 of the Standard Specifications for Road and Bridge Construction, become part of the contract. Bidders are cautioned to read and examine carefully all documents, to make all required inspections, and to inquire or seek explanation of the same prior to submission of a bid.  
  
(b) State law, and, if the work is to be paid wholly or in part with Federal-aid funds, Federal law requires the bidder to make various certifications as a part of the proposal and contract. By execution and submission of the proposal, the bidder makes the certification contained therein. A false or fraudulent certification shall, in addition to all other remedies provided by law, be a breach of contract and may result in termination of the contract.
- 4. AWARD CRITERIA AND REJECTION OF BIDS.** This contract will be awarded to the lowest responsive and responsible bidder considering conformity with the terms and conditions established by the Department in the rules, Invitation for Bids and contract documents. The issuance of plans and proposal forms for bidding based upon a prequalification rating shall not be the sole determinant of responsibility. The Department reserves the right to determine responsibility at the time of award, to reject any or all proposals, to readvertise the proposed improvement, and to waive technicalities.

By Order of the  
Illinois Department of Transportation

Milton R. Sees, Secretary

BD 351 (Rev. 01/2003)

INDEX  
FOR  
SUPPLEMENTAL SPECIFICATIONS  
AND RECURRING SPECIAL PROVISIONS

Adopted January 1, 2008

This index contains a listing of SUPPLEMENTAL SPECIFICATIONS and frequently used RECURRING SPECIAL PROVISIONS.

ERRATA Standard Specifications for Road and Bridge Construction (Adopted 1-1-07) (Revised 1-1-08)

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LR 503-2		Furnishing Class SI Concrete (Short Load)	Jan. 1, 1989	Jan. 1, 2002
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**BDE SPECIAL PROVISIONS**  
For the January 18 and March 7, 2008 Lettings

The following special provisions indicated by an "x" are applicable to this contract. An \* indicates a new or revised special provision for the letting.

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80186			Alkali-Silica Reaction for Cast-in-Place Concrete	Aug. 1, 2007	
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80173			Bituminous Materials Cost Adjustments	Nov. 2, 2006	Jan. 2, 2007
50261			Building Removal-Case I (Non-Friable and Friable Asbestos)	Sept. 1, 1990	Jan. 1, 2007
50481			Building Removal-Case II (Non-Friable Asbestos)	Sept. 1, 1990	Jan. 1, 2007
50491			Building Removal-Case III (Friable Asbestos)	Sept. 1, 1990	Jan. 1, 2007
50531			Building Removal-Case IV (No Asbestos)	Sept. 1, 1990	Jan. 1, 2007
80166	31	X	Cement	Jan. 1, 2007	Nov. 1, 2007
* 80193			Concrete Barrier	Jan. 1, 2008	
80177			Digital Terrain Modeling for Earthwork Calculations	April 1, 2007	
80029	34	X	Disadvantaged Business Enterprise Participation	Sept. 1, 2000	Jan. 1, 2007
* 80178	42	X	Dowel Bars	April 1, 2007	Jan. 1, 2008
80167			Electrical Service Installation – Traffic Signals	Jan. 1, 2007	
80190			Engineer's Field Office (Long Distance Bill)	Nov. 1, 2007	
80179			Engineer's Field Office Type A	April 1, 2007	
80175			Epoxy Pavement Markings	Jan. 1, 2007	
* 80189	43	X	Equipment Rental Rates	Aug. 2, 2007	Jan. 2, 2008
80180	45	X	Erosion and Sediment Control Deficiency Deduction	April 1, 2007	
80169			High Tension Cable Median Barrier	Jan. 1, 2007	
* 80194			HMA – Hauling on Partially Completed Full-Depth Pavement	Jan. 1, 2008	
80181			Hot-Mix Asphalt – Field Voids in the Mineral Aggregate	April 1, 2007	
* 80136			Hot-Mix Asphalt Mixture IL-4.75	Nov. 1, 2004	Jan. 1, 2008
* 80195			Hot-Mix Asphalt Mixture IL-9.5L	Jan. 1, 2008	
80109			Impact Attenuators	Nov. 1, 2003	Jan. 1, 2007
80110			Impact Attenuators, Temporary	Nov. 1, 2003	Jan. 1, 2007
* 80196			Mast Arm Assembly and Pole	Jan. 1, 2008	
80045			Material Transfer Device	June 15, 1999	Jan. 1, 2007
80165			Moisture Cured Urethane Paint System	Nov. 1, 2006	Jan. 1, 2007
80082			Multilane Pavement Patching	Nov. 1, 2002	
80129			Notched Wedge Longitudinal Joint	July 1, 2004	Jan. 1, 2007
80182			Notification of Reduced Width	April 1, 2007	
* 80069			Organic Zinc-Rich Paint System	Nov. 1, 2001	Jan. 1, 2008
80022	46	X	Payments to Subcontractors	June 1, 2000	Jan. 1, 2006
80134			Plastic Blockouts for Guardrail	Nov. 1, 2004	Jan. 1, 2007
80119			Polyurea Pavement Marking	April 1, 2004	Jan. 1, 2007
80170			Portland Cement Concrete Plants	Jan. 1, 2007	
80171	48	X	Precast Handling Holes	Jan. 1, 2007	
80015			Public Convenience and Safety	Jan. 1, 2000	
34261			Railroad Protective Liability Insurance	Dec. 1, 1986	Jan. 1, 2006
80157			Railroad Protective Liability Insurance (5 and 10)	Jan. 1, 2006	
80172	50	X	Reclaimed Asphalt Pavement (RAP)	Jan. 1, 2007	Aug. 1, 2007

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80183	55A	X	Reflective Sheeting on Channelizing Devices	April 1, 2007	
* 80151	56	X	Reinforcement Bars	Nov. 1, 2005	Jan. 2, 2008
80164			Removal and Disposal of Regulated Substances	Aug. 1, 2006	Jan. 1, 2007
80184	58	X	Retroreflective Sheeting, Nonreflective Sheeting, and Translucent Overlay Film for Highway Signs	April 1, 2007	
80131	64	X	Seeding	July 1, 2004	Aug. 1, 2007
80152			Self-Consolidating Concrete for Cast-In-Place Construction	Nov. 1, 2005	Jan. 1, 2007
80132	66	X	Self-Consolidating Concrete for Precast Products	July 1, 2004	Jan. 1, 2007
* 80197	68	X	Silt Filter Fence	Jan. 1, 2008	
80127			Steel Cost Adjustment	April 2, 2004	April 1, 2007
80153			Steel Plate Beam Guardrail	Nov. 1, 2005	Aug. 1, 2007
80191	68A	X	Stone Gradation Testing	Nov. 1, 2007	
80143	69	X	Subcontractor Mobilization Payments	April 2, 2005	
80075			Surface Testing of Pavements	April 1, 2002	Jan. 1, 2007
* 80087	70	X	Temporary Erosion Control	Nov. 1, 2002	Jan. 1, 2008
80176	71	X	Thermoplastic Pavement Markings	Jan. 1, 2007	
80161			Traffic Signal Grounding	April 1, 2006	Jan. 1, 2007
20338			Training Special Provisions	Oct. 15, 1975	
80185			Type ZZ Retroreflective Sheeting, Nonreflective Sheeting, and Translucent Overlay Film for Highway Signs	April 1, 2007	
80162			Uninterruptable Power Supply (UPS)	April 1, 2006	Jan. 1, 2007
80149			Variable Spaced Tining	Aug. 1, 2005	Jan. 1, 2007
80163			Water Blaster with Vacuum Recovery	April 1, 2006	Jan. 1, 2007
80071	73	X	Working Days	Jan. 1, 2002	

The following special provisions have been **deleted** from use:

80187 Legal Requirements to be Observed

The following special provisions are in the 2008 Supplemental Specifications and Recurring Special Provisions:

File Name	Special Provision Title	New Location	Effective	Revised
80168	Errata for the 2007 Standard Specifications	Supplemental	Jan. 1, 2007	Aug. 1, 2007
80142	Hot-Mix Asphalt Equipment, Spreading and Finishing Machine	Article 1102.3	Jan. 1, 2005	Jan. 1, 2007
80148	Planting Woody Plants	Section 253	Jan. 1, 2006	
80160	Reflective Crack Control Treatment	Section 443, Article 1062.04	April 1, 2006	Jan. 1, 2007
80154	Turf Reinforcement Mat	Section 251	Nov. 1, 2005	Jan. 1, 2007

The following special provisions require additional information from the designer. The additional information needs to be included in a separate document attached to this check sheet. The Project Development and Implementation section will then include the information in the applicable special provision. The Special Provisions are:

- Building Removal-Case I
- Building Removal-Case II
- Building Removal-Case III
- Building Removal-Case IV
- DBE Participation
- Material Transfer Device
- Railroad Protective Liability Insurance
- Training Special Provisions
- Working Days

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The following Special Provisions supplement the "Standard Specifications for Road and Bridge Construction", Adopted January 1, 2007, the latest edition of the "Manual on Uniform Traffic Control Devices for Streets and Highways", and the "Manual of Test Procedures of Materials" in effect on the date of invitation of bids, and the Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included here in which apply to and govern the construction of MFT Sections 03-00026-00-PK and 06-00026-01-MS, and in case of conflict with any part, or parts, of said Specifications, the said Special Provisions shall take precedence and shall govern.

**PROJECT LOCATION**

This Project is located adjacent to Confluence Tower Drive, South of West Piasa Lane, in the Village of Hartford, Madison County, Illinois.

**PROJECT DESCRIPTION**

This Project consists of the construction of restrooms, parking lot, sidewalk, water and sanitary sewer service lines and drainage appurtenances.

**SUPPLEMENTAL SPECIFICATIONS FOR UTILITY WORK**

Water and sanitary sewer main work shall be according to the requirements of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, as developed jointly by the Illinois Society of Professional Engineers, the Illinois Municipal League, the Associated General Contractors of Illinois and the Underground Contractors Association, except as provided for in the Construction Plans and these Special Provisions.

Compliance with this Special Provision will not be measured or paid for.

**COORDINATION WITH OTHER PROFESSIONAL DISCIPLINES**

There are several construction items and details which are covered in other sections of the construction plans – architectural, structural, electrical and mechanical – which directly impact the work in the civil section. Therefore, all civil work shall be coordinated with all other work to insure a true and complete project according to all construction plans as directed by the Engineer.

Compliance with this Special Provision will not be measured or paid for.

**TRAFFIC PROHIBITION ON COMPLETED CONSTRUCTION**

The Contractor shall allow no construction related vehicles (equipment, employee vehicles, etc.) upon any part of the completed construction. Construction access and employee parking shall be as designated by the Contractor and Resident Engineer.

This Special Provision will not be measured or paid for.

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**JOINT UTILITY LOCATING INFORMATION FOR EXCAVATORS (JULIE)**

Within the State of Illinois there now exists a "one-call" system for notification of proposed excavation to utility owners, which is known as the Joint Utility Locating Information for Excavators (JULIE) system. However, not all utility companies are a part of this system. For utilities which are not members of the JULIE system, it will still be necessary to contact the owners directly.

For members of the JULIE system, it will be necessary to call the JULIE number (800) 892-0123 and they will notify all member utility companies involved that their respective utility should be located. A minimum of forty-eight (48) hours advance notice is required for notification to utilities.

If any of the location markers placed by a utility company in conformance with this procedure are destroyed by Contractor operations, the Contractor shall immediately notify the utility owner and bear the cost of remarking the facilities at his own cost and expense. Compliance with this Special Provision will not be measured or paid for.

**SHORING, SHEETING AND BRACING**

The Contractor shall be responsible for determining the need for shoring, sheeting and bracing. Should the Contractor deem necessary the need for shoring, sheeting or bracing to protect property and life and/or comply with OSHA standards, this Special Provision shall govern.

The structural strength and safety of all sheeting, shoring, and bracing shall be the sole responsibility of the Contractor. The repair of any damage resulting from failure to provide adequate supports shall be the responsibility of the Contractor.

Provide timber work, shoring, bracing and sheeting where necessary to retain banks of excavations, prevent cave-in of adjacent ground, prevent displacement of utilities and structures, and to safely protect the public.

All material used to perform work under this section shall meet all local, state and federal requirements.

Furnish, install, and maintain, sheeting, bracing, and shoring support required to keep excavations within the easement provided, to support the sides of the excavation, and to prevent any movement which may damage adjacent pavements or structures, damage or delay the work, or endanger life and health. Voids outside the supports shall be immediately filled and compacted.

Sheeting, where required, shall be driven below the bottom of excavation so the lowest set of wales and struts are above the bottom of the excavation to allow necessary working room.

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The Contractor may leave in place, to be embedded in the backfill of the excavation, any or all supports for the purpose of preventing injury to persons or property, whether public or private. However, no supports which are within four feet (4') of the ground or pavement surface may be left in place.

All supports not left in place shall be removed in such a manner as to avoid endangering the piping, structures, utilities or property, whether public or private. All voids left by the withdrawal of sheeting shall be immediately filled and compacted.

This work will not be measured or paid for but shall be considered included in the contract unit prices for the various items work involved, and no additional compensation will be allowed.

**CONSTRUCTION AND MAINTENANCE SIGNS**

This work shall conform with the requirements of SECTION 1106. WORK ZONE TRAFFIC CONTROL DEVICES of the Standard Specifications except as hereinafter modified.

All construction signs mounted on permanent support for use in temporary traffic control having an area of ten (10) square feet are more shall be mounted on two (2) 4" X 4" or two (2) 4" X 6" wood posts.

Type A metal post (two for each sign) and conforming with Article 1006.29 of the Standard Specifications may be used in lieu of wood posts. Type A metal posts used for these signs may be unfinished.

This work will not be measured or paid for but shall be considered included in the contract unit price for TRAFFIC CONTROL AND PROTECTION.

**WATERLINE / SEWER LINE CROSSINGS**

Water mains crossing sewers (including service lines) shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. Special structural support for the water and sewer pipes may be required.

In the event the above requirements cannot be met, the details set forth in Standard Drawings 19, 20, 21, 22 and 23 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, shall govern the proposed work.

This work will not be measured or paid for.

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**TRAFFIC CONTROL PLAN**

Traffic control shall be according to the applicable sections of the "Standard Specifications for Road and Bridge Construction", the applicable guidelines contained in the "Manual on Uniform Traffic Control Devices for Streets and Highways", and the Illinois Supplement thereto, these Special Provisions, and any special details and Highway Standards contained herein and in the plans.

Traffic Control will only be required during construction of the Bike Trail Access path at its connection to the Confluence Bike Path (specifically Standard 701301) and during construction immediately adjacent to Confluence Tower Drive (specifically Standard 701501 for the driveway and Standard 701301 for water main and other site work).

At the preconstruction meeting, the Contractor shall furnish the name of the individual in his direct employ who is responsible for the installation and maintenance of the traffic control for this project. If the actual installation and maintenance are to be accomplished by the sub-contractor, consent shall be requested of the Engineer at the time of the preconstruction meeting according to Article 108.01 of the Standard Specifications. This shall not relieve the Contractor of the foregoing requirement for a responsible individual in his direct employ.

The Contractor shall furnish, erect, maintain and remove all warning signs, flags, barricades and lights according to Article 107.14 and Sections 701 and 703 of the Standard Specifications, the latest edition of the "Manual of Uniform Traffic Control Devices" as required or as directed by the Engineer.

Special attention is called to Articles 107.09 and 107.14 and Section 701 and 703 of the Standard Specifications and the following Highway Standards relating to traffic control:

701001, 701301, 701501 and 701901

This item of work will not be measured or paid for but shall be included in the contract unit price for TRAFFIC CONTROL AND PROTECTION.

TRAFFIC CONTROL AND PROTECTION STANDARD 701501 will be measured and paid for separately.

**DUCTILE IRON WATER MAIN FITTINGS**

This item of work consists of furnishing and installing various water main fittings at the locations shown on the Construction Plans, or as directed by the Engineer. The water main fittings shall be Class 350 minimum and in conformity with the requirements of the ANSI/AWWA C153/A21.53-94 and ANSI/AWWA C111/A21.11. The working pressure rating shall be 350 p.s.i.

The water main fittings shall have interior and exterior coatings which conform to AWWA C-110 and shall bear the manufacturer's mark including the nominal diameter of openings (and the

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number of degrees in fractions of a circle on all bends), and the pressure rating cast distinctly on the fittings.

The installation of the water main fittings shall be in accordance with the details shown on the Construction Plans and the manufacturer's recommendation, or as directed by the Engineer.

Concrete thrust blocks shall be furnished and installed at all changes in direction. Concrete thrust blocks shall be constructed of Class SI concrete and to the dimensions set forth in, or calculated in accordance with, the Construction Plans; and, in accordance with the requirements of Section 41-2.09 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, or as directed by the Engineer. At the discretion of the Contractor, restrained joints may be used in lieu of concrete thrust blocking. Concrete thrust blocks or restrained joints will not be measured or paid for.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the proposed water main fittings and the method of construction and installation, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This work will be measured complete in place and paid for at the contract unit price per each for DUCTILE IRON WATER FITTINGS, of the size and type, shown on the Construction Plans.

### **SANITARY SEWER SERVICE 6"**

At the location shown on the plans or where directed by the Engineer, a 6" sanitary sewer service line shall be constructed, by boring, to the point of connection at the building, at a minimum slope of 1%. Cleanouts shall be placed at all bends and at the connection point of the existing (building) service line and the new service line. This work shall be constructed generally in accordance with the requirements of Section 31 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996 and latest revisions, except that testing will not be required.

This item of work will be measured along the sanitary sewer service line, and paid for at the contract unit price per foot for SANITARY SEWER SERVICE 6".

### **CONSTRUCTION STAKING**

#### **Responsibility of the Contractor**

The Contractor shall furnish and place construction layout stakes for this project. The Owner will provide adequate reference points to the centerline of survey and benchmarks as shown in

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the plans and listed herein. Any additional control points set by the Owner will be identified in the field to the Contractor and all field notes will be kept in the office of the Engineer.

The Contractor shall provide field forces, equipment, and material to set all additional stakes for this project, which are needed to establish offset stakes, reference points, and any other horizontal or vertical controls, including supplementary benchmarks, necessary to secure a correct layout of the work.

Stakes for line and grade of pavement and/or curb shall be set at sufficient station intervals (not to exceed 50 ft.) to assure substantial conformance to plan line and grade. The Contractor will not be required to set additional stakes to locate a utility line which is not included as a pay item in the contract nor to determine property lines between private properties.

The Contractor shall be responsible for having the finished work conform to the lines, grades, elevations, and dimensions called for in the plans. Any inspection or checking of the Contractor's layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his/her responsibility to secure the proper dimensions, grades and elevations of the several parts of the work. The Contractor shall exercise care in the preservation of stakes and benchmarks and shall have them reset at his/her expense when any are damaged, lost, displaced, or removed or otherwise obliterated.

Responsibility of the Owner

The Owner will locate and reference sufficient horizontal control points for the Contractor to adequately layout and stake the proposed work.

Bench marks will be established along the project outside of construction lines not exceeding 1,000 ft. intervals horizontally and 20 ft. vertically.

These stakes will be identified in the filed to the Contractor.

The Engineer may make random checks of the Contractor's staking to determine if the work is in conformance with the plans.

The Engineer will make all measurements and take all cross sections from which the various pay items will be measured.

Where the Contractor, in setting construction stakes, discovers discrepancies in the control points or benchmarks, the Owner will check to determine their nature and make whatever revisions are necessary in the plans, including the re-cross-sectioning of the area involved.

Any additional restaking done by the Contractor as a result of any such discrepancy in the control points or benchmarks will be paid for according to 109.04 of the Standard Specifications.



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It is not the responsibility of the Engineer, except as provided herein, to check the correctness of the Contractor's stakes; any errors apparent will be immediately called to the Contractor's attention and s(he) shall make the necessary correction before the stakes are used for construction purposes.

Where the plan quantities for excavation are to be used as the final quantities, the Engineer will make sufficient checks to determine if the work has been completed in conformance with the plan cross sections.

Responsibility of the Contractor

The Contractor shall establish from the given control points and benchmarks all the control points necessary to construct the individual project elements. The Contractor shall provide the Engineer adequate control in close proximity to each individual element to allow adequate checking of construction operations. This includes, but is not limited to, line and grade stakes, line and grade nails in form work, and/or filed or etched marks in substantially completed construction work. It is the Contractor's responsibility to tie in control points in order to preserve them during construction operations.

All work shall be according to normally accepted self-checking surveying practices. Field notes shall be kept in standard survey field notebooks and those books shall become the property of the Owner/Engineer at the completion of the project. All notes shall be neat, orderly and in accepted form.

Upon completion of all construction, as-constructed drawings shall be prepared based on survey information obtained by recording all horizontal and vertical information for all construction. These as-constructed drawings shall be furnished to the Owner in electronic format suitable to the Owner.

This item will not be measured, but shall be paid for at the contract lump sum price for CONSTRUCTION STAKING.

FENCE RAIL

This item of work consists of furnishing and installing a fence rail as shown on the plans or as directed by the Engineer.

All fence elements shall be No. 1 Southern Yellow Pine as graded by the Southern Pine Inspection Bureau and shall be pressure treated according to allowable industry standards for human contact and in compliance with the Standard Specifications.

Each piece of timber shall carry a grade stamp and quality assurance stamp indicating class of timber and chemical retention.

The posts shall be installed according to the applicable requirements of Article 630.05 Posts. of

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the Standard Specifications. All fasteners and other metal hardware shall be according to Article 1006.29(d) of the Standard Specifications.

The fence rail shall be installed closely fitted, accurately set in place and secured using fasteners and braces as shown on the plans. "Butt" joints will not be allowed. All joints shall be bevel cut at an angle of 75 degrees, or as required by the specific layout, prior to fitting and securing the timber sections.

This work will be measured in place from centerline of end post to centerline of end post in feet and paid for at the contract unit price per foot for FENCE RAIL.

**BUILDING**

This item of work shall consist of furnishing and installing one complete building as shown in the construction plans and according to the requirements therefor in these Special Provisions.

This item of work will not be measured but will be paid for at the contract lump sum price for BUILDING.

**FUSION WELDED PIPE, 8" H.D.P.E., SDR-11, 160 PSI**

This item of work consists of the directional boring installation of the 8" H.D.P.E. utility lines at the locations shown on the plans.

The fusion welded pipe shall be high density polyethylene pipe meeting the specified requirements and shall be approved by the Engineer.

The fusion welding of the high density polyethylene pipe shall be performed as recommended by the manufacturer. The installation shall be generally in accordance with the applicable requirements of Article 20-2.19 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, the manufacturer's recommendations and these Special Provisions. The diameter of the boring head shall be sufficiently larger than the high density polyethylene pipe to prevent any upward vertical upheaval of the overhead surface. All work shall cease if any upward vertical movement is noted, the pipe shall be removed and the hole shall be rebored using a larger diameter boring head. There will be no compensation for any additional work caused by this requirement of the special provisions.

Fittings or adapters used to connect the high density polyethylene pipe to other pipe types shall be included in the contract unit price bid for fusion welded pipe, 8" H.D.P.E., SDR-11, 160 psi, and no additional compensation will be allowed.

Bore pits are not allowed. Open excavations will only be allowed at terminal structures and service connections. These open excavations shall be backfilled with a clay material to 95% compaction.

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Directional boring shall be completed with the use of a directional boring machine, as manufactured by "Ditch Witch", "Vermeer", or equivalent. The directional boring machine shall be supplied with an output signal inside the housing of the drill bit. The output signal shall have a constant output signal to allow a person to track the location of the beacon at all times. The drill bit shall be located a maximum of every 3 feet for exact location of the line to be pulled in. When bore is completed, Contractor shall provide the Owner with a plot of the horizontal and vertical bore path.

The operator of the drilling unit shall check the bore path and position of boring bit every 3 feet and make any necessary corrections to stay along the alignment. The Contractor shall make necessary provisions to keep water and soil out of the installed piping.

The drilling machine shall be equipped with a drilling fluid compatible for the on-site conditions. The fluid, such as bentonite, shall be used for lubricating the pipe during pull-back, forcing spoils out of the pipe pit, assisting in holding the hole open during pull back, and hardening into a clay substance around the outside of the conduit, preventing settlement of the ground. Adequate drilling fluids shall be used to avoid a "hydra-lock" condition. The directional head shall be capable of accepting a variety of cutting bits for varied soil and/or rock conditions.

The final horizontal alignment of the sanitary sewer shall not vary more than 1/2% of the total bored length. The final vertical alignment of the sanitary sewer shall not vary more than 1/10 foot from the design terminal elevations and the design slope. If the final installation exceeds the allowable tolerances, the construction shall be removed and replaced, unless specifically accepted in writing by the construction manager or Engineer. If any removal and reboring results in an annular void around the installed pipe, it shall be pressure grouted to fill all void areas.

Following installation, the water main shall be: tested in accordance with Section 42-2.13 (pressure testing duration shall be four (4) hours); and, disinfected in accordance with Section 42-2.14; of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996. Following disinfection, any wasted water shall be treated to neutralize the chlorine residual and shall be discharged in such manner that there will be no damage downstream of the discharge point.

Following installation, the sanitary sewer main shall be: tested in accordance with Section 31-1.11 (exfiltration of air under pressure and for deflection) of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996.

This item of work will be measured complete, in place, and paid for at the contract unit price per foot for FUSION WELDED PIPE, 8" H.D.P.E., SDR-11, 160 PSI. The testing will not be measured or paid for but shall be included in the contract unit price for this item of work.

This work is subject to inspection by the Wood River Drainage and Levee District and the U.S. Army Corps of Engineers who may impose additional restrictions on this work. Additional requirements imposed by either of the above agencies will be paid for in accordance with Article 109.04 of the Standard Specifications.

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**MANHOLES (LEAKAGE TESTING)**

Prior to placing the completed sanitary system in service, each manhole shall be tested for leakage in accordance with ASTM C1244-02. Failing manholes shall be repaired and retested as necessary to achieve an acceptable result.

This work will be measured complete in place and paid for at the contract unit price per each for MANHOLES (LEAKAGE TESTING).

**MANHOLES, TYPE A, 4' DIAMETER, WATERPROOF FRAME & BOLTED LID**

This item of work consists of furnishing and installing sanitary manholes at the locations shown on the plans or as directed by the Engineer. The sanitary manholes shall be constructed in accordance with the requirements set forth in SECTION 602. CATCH BASIN, MANHOLE, INLET, DRAINAGE STRUCTURE, AND VALVE VAULT CONSTRUCTION, ADJUSTMENT, AND RECONSTRUCTION of the Standard Specifications, except that the frame and lid shall be as shown in the Construction Plans.

This work will be paid for at the contract unit price per each for MANHOLES, TYPE A, 4' DIAMETER, WATERPROOF FRAME & BOLTED LID.

**OUTFALL STRUCTURE**

This item of work consists of the construction of an outfall structure at the location shown on the plans. The outfall structure shall be constructed in accordance with the details shown on the Construction Plans, the applicable requirements of the American Concrete Institute, and generally in accordance with the applicable requirements of Section 503. Concrete Structures of the Standard Specifications. The work shall include all ancillary items shown on the construction plans and the finished product shall function as indicated. Precasting of the structure will be allowed.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the proposed trench drainage system and the method of construction, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This work will be measured in place and paid for at the contract unit price per each for OUTFALL STRUCTURE, which price shall include all labor, material and equipment necessary to complete the work and no additional compensation will be allowed. Reinforcement bars shall be included in the contract unit price for this item of work.

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**REMOVE EXISTING CAP**

This item of work shall consist of the removal of the cap on the existing sanitary sewer line, the installation of the suitable transition fitting to connect the existing sanitary sewer line to the proposed HDPE sanitary sewer line and the connection of said transition fitting to the proposed HDPE sanitary sewer line.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the proposed transition fitting and the method of construction and installation, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This work will be measured complete in place and paid for at the contract unit price per each for REMOVE EXISTING CAP.

**REMOVE EXISTING PLUG**

This item of work shall consist of the removal of the plug on the existing water main; the installation of the suitable transition fitting to connect the existing water main to the proposed HDPE water main; the connection of said transition fitting to the proposed HDPE water main; and, connection of the existing tracer wire to the proposed tracer wire.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the proposed transition fitting and the method of construction and installation, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This work will be measured complete in place and paid for at the contract unit price per each for REMOVE EXISTING PLUG.

**WATER MAIN TRACER WIRE**

This item of work consists of furnishing and installing a tracer wire on the proposed water main as shown on the Construction Plans, or as directed by the Engineer. The tracer wire shall be 12 gauge, rubber coated, soft-drawn, solid copper wire and shall be secured to the water main at ten (10) foot intervals with the appropriate looping (or coil) as called for in the Construction Plans, or as directed by the Engineer.

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The Contractor shall furnish seven (7) sets of manufacturer's "cut" sheets showing the pertinent information of the proposed tracer wire, to the Engineer for approval before beginning this work. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of the manufacturer's "cut" sheets will be returned to the Contractor before any work shall be commenced on this item.

This item of work will be measured complete, in place, and paid for at the contract unit price per foot for WATER MAIN TRACER WIRE.

**WATER METER**

This item of work shall consist of the installation of a concrete vault, required piping and valving and a new 8" water meter and appurtenant items in accordance with the requirements of the "Standard Specifications for Water and Sewer Main Construction in Illinois", Adopted May, 1996 and generally in accordance with the details shown in the Construction Plans.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the work and the method of construction, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This item of work will be measured complete and in place and paid for at the contract unit price per each for WATER METER, which price shall be payment in full for all labor, equipment and material required to complete this item and no additional compensation will be allowed.

**CONSTRUCTION ACCESS**

This item of work consists of the construction and maintenance of a construction access point to provide a means to access or exit the construction site and prevent the tracking of sediment onto Confluence Tower Drive.

This construction access shall be constructed at a location determined by the Engineer and in generally in accordance with the detail shown on the Construction Plans or as directed by the Engineer. This construction access may utilize the existing access location if the top six (6) inches thereof are replaced with the required 2" stone. This construction access shall be continually maintained in a condition which will prevent the tracking of sediment onto CONFLUENCE Tower Drive. This may require the periodic top dressing with stone and/or the repair or clean-up of the construction access as required by the Engineer. Debris removed from

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the cleaning shall be disposed of, off-site, in accordance with all applicable ordinances and regulations.

When no longer needed, as determined by the Engineer, the construction access shall be removed and disposed of off-site in accordance with all applicable ordinances and regulations.

The initial construction of this construction access will be measured in place and paid for at the contract unit price per each for CONSTRUCTION ACCESS. Maintenance of this construction access will be paid for in accordance with Article 109.04 of the Standard Specifications.

**FIRE HYDRANT COMPLETE**

This item of work consists of furnishing and installing a fire hydrant at the location shown on the Construction Plans, or as directed by the Engineer. The fire hydrant, and installation thereof, shall be in accordance with the details shown on the Construction Plans, the manufacturer's recommendation and Section 45 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, or as directed by the Engineer, except in cases of conflict, the Construction Plans shall prevail.

Concrete thrust blocks shall be furnished and installed at all changes in direction. Concrete thrust blocks shall be constructed of Class SI concrete and to the dimensions set forth in, or calculated in accordance with, the Construction Plans; and, in accordance with the requirements of Section 41-2.09 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, or as directed by the Engineer. At the discretion of the Contractor, restrained joints may be used in lieu of concrete thrust blocking. Concrete thrust blocks or restrained joints will not be measured or paid for.

The Contractor shall furnish seven (7) detailed sets of shop drawings, and/or specifications showing the type and pertinent information of the proposed fire hydrant and the method of construction and installation, to the Engineer for approval before beginning fabrication and/or construction. The Engineer shall review this submittal and return same to the Contractor within fifteen (15) days, following receipt, stating approval thereof or required revisions and resubmittal. Resubmittals shall adhere to the same time constraint. Three (3) sets of approved shop drawings will be returned to the Contractor before any work shall be commenced on this item.

This work will be measured complete in place and paid for at the contract unit price per each for FIRE HYDRANT COMPLETE.

**SEEDING, CLASS 1 (MODIFIED)**

Seeding shall be performed according to SECTION 250.SEEDING and SECTION 251.MULCH, of the Standard Specifications except as herein modified or supplemented.

All disturbed areas not otherwise being surfaced are to be seeded.

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The third paragraph of Article 250.04 shall be revised to read as follows: The quantities and application rates of fertilizer nutrients shall be as specified in this Special Provision or as directed by the Engineer. Fertilizer nutrients for seeding shall be applied at the total rate of 240 pounds per acre. There shall be two (2) applications of fertilizer nutrients. The fertilizer for seeding shall be a ready-mixed material containing the following nutrients expressed in percent of the total weight of the ready-mixed material: 10 percent nitrogen, 6 percent available phosphoric acid, and 4 percent water-soluble potash (10-6-4 analysis), or any other mixture having an analysis for these nutrients in the ratio of 5/3/2.

The seeding mixture shall be as specified for Class 1. Hydraulic seeding will be allowed.

Examine the areas and conditions under which this work is to be performed and notify the Engineer in writing of conditions detrimental to the proper and timely completion of the work. Start of work or failure to give notification constitutes acceptance of existing conditions.

Ground preparation shall not be started until all stones, boulders, debris, and similar material larger than one-half inch (1/2") in diameter have been removed, depressions and ruts filled and the entire area to be seeded has been shaped, trimmed, and finished uniformly to the lines, grades and cross sections shown on the drawing and to the satisfaction of the Engineer.

The area to be seeded shall be thoroughly tilled and cultivated to a minimum depth of three inches (3") with a disc, tiller or other equipment approved by the Engineer, reducing all soil particles to a size not larger than one-half inch (1/2") in the largest dimension. The prepared surface shall be smooth, dry and free from all weeds, clods, stones, roots, rivulets, gullies, crusting and caking.

After cultivation and after the areas to be seeded have been approved by the Engineer, the fertilizer shall be applied and worked into the soil using a harrow, or other approved equipment.

After fertilizing and prior to seeding ground, surface shall be smooth, dry, friable and of uniformly fine texture. No seed shall be placed when the ground is not in a proper condition, and no seed shall be placed until the prepared ground surface has been approved by the Engineer. If, as a result of rain, the prepared ground surface becomes crusted or eroded; or if eroded places, ruts, or depressions exist for any reason, the Contractor shall rework the soil to the satisfaction of the Engineer. No seed shall be sown during high winds, nor shall any seed be sown until the purity test has been completed for the seeds to be used and shows that the seed meets the noxious weed seed requirements. The optimum depth for seeding shall be one-quarter inch (1/4"). Seeding shall be done in two (2) directions at right angles to each other.

Broadcasting will not be allowed except in inaccessible areas as approved by the Engineer. The seed shall be broadcast evenly by hand or with an approved seeding device. The seed shall be covered with a thin layer of topsoil by light raking or other approved method. The optimum depth for broadcast seeding shall be one-quarter inch (1/4").



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Mulch shall be applied according to Method 2. Procedure 2 of Article 251.03 of the Standard Specifications. The rate of application of the mulching shall be 2 tons per acre.

Add the following paragraph to Article 1081.04: No reduction will be permitted in the specified quantity of seed if the purity or germination, or both, are higher than the minimum required by the specifications.

All grading, seeding, fertilizing and mulching shall be included in the contract unit price for this item of work.

This work will be measured in place and will be paid for at the contract unit price per acre for SEEDING, CLASS 1 (MODIFIED).

A portion of this work is subject to inspection by the Wood River Drainage and Levee District and the U.S. Army Corps of Engineers who may impose additional restrictions on this work. Additional requirements imposed by either of the above agencies will be paid for according to Article 109.04 of the Standard Specifications.

**SEEDING, CLASS 7 (MODIFIED)**

This item of work shall be constructed according to SECTION 250. SEEDING except as modified in this Special Provision or as directed by the Engineer.

The maximum size for stones, boulders, debris, and similar material to be removed shall be revised to be one-half inch (1/2"). The maximum size for all soil particles shall be revised to be one-half inch (1/2").

This item of work will be measured in place and paid for at the contract unit price per acre for SEEDING, CLASS 7 (MODIFIED).

**WATER SERVICE LINE, 2 1/2"**

This item of work consists of the installation, by boring, of an individual water service line as shown on the plans or as directed by the Engineer. The work includes the furnishing and installation of a brass corporation stop and the required length of rigid copper piping; and appurtenant items. This work shall be performed according to Section 41-2.11 of the "Standard Specifications for Water and Sewer Main Construction in Illinois", adopted May, 1996, except that testing will not be required; and according to Section 562. Water Service Line of the Standard Specifications.

This work will be measured in place, along the centerline of the water service line and paid for at the contract unit price per foot for WATER SERVICE LINE, 2 1/2" which shall be payment in full for all labor, equipment and material required to complete this item and no additional compensation will be allowed.

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**PAVED DITCH (SPECIAL)**

This item of work shall be constructed generally in accordance with Section 606. Concrete Gutter, Curb, Median, and Paved Ditch of the Standard Specifications and the details shown on the construction plans, except that reinforcement bars will not be measured or paid for separately.

This work will be measured in place and paid for at the contract unit price per foot for PAVED DITCH (SPECIAL), which price shall include all labor, material and equipment necessary to complete the work as shown and no additional compensation will be allowed. Reinforcement bars shall be included in the contract unit price for this item of work.

**TRAFFIC CONTROL AND PROTECTION**

This item of work consists of furnishing, installing, maintaining and removing all traffic control devices for traffic control and protection as shown on Highway Standards 701001 and 701301 in accordance with the TRAFFIC CONTROL PLAN, and in accordance with Section 701 of the Standard Specifications, or as directed by the Engineer.

Throughout the construction period, all material piles, equipment, open excavations or other obstructions or hazards to motorists or pedestrians shall be enclosed by fences or protected by barricades and proper lighting (i.e., flashing lights).

Traffic Control Surveillance as described in Article 701.04(b)(2) of the Standard Specifications will not be measured or paid for.

This work will be paid for, one time only, at the contract lump sum price for TRAFFIC CONTROL AND PROTECTION.

**REMOVE AND RELOCATE FLAGPOLE**

This item of work consists of the removal of the existing flagpole and its relocation to a location directed by the Resident Engineer. The existing flagpole is mounted in an aggregate filled cavity of unknown depth. Following removal of the flagpole, the resulting cavity shall be brought to grade with CA-6 coarse aggregate and compacted to the satisfaction of the Resident Engineer.

The flagpole shall be re-erected in accordance with the manufacturers recommended installation methods. The method of installation shall be reviewed and approved by the Resident Engineer prior to the actual work.

This work will be paid for at the contract unit price per each for REMOVE AND RELOCATE FLAGPOLE.

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**STATUS OF UTILITIES**

There are no public utilities within the construction limits of this Project requiring adjustment, removal or relocation.

The above represents the best information available to the Owner. The applicable provisions of Articles 105.07 and 107.20 of the Standard Specifications shall apply.

**Required Contract Provisions  
All Contracts  
Monthly Labor Summary and Activity Reporting System**

Effective: 1-1-1995    Revised June 2001

**I. Monthly Labor Summary Report, Form SBE 148**

The prime contractor and each first and second tier sub-contractor, (hereinafter referred to as "subcontractor") shall submit a certified Monthly Labor Summary Report directly to the District Engineer.

This report is in lieu of submittal of the Monthly Workforce Analysis Report, Form SBE 956.

This report must be received in District Eight no later than the tenth day of the next month.

This Report shall be submitted by the prime contractor and each subcontractor, for each consecutive month, from the start, to the completion of their work on the contract.

The data source for this Report will be a summation of all personnel and hours worked on each subject contract for the month based on weekly payrolls for that month.

The Monthly Labor Summary Report is required to be submitted in one of the following formats:

- a.) For contractors having IDOT contracts valued in the aggregate at \$250,000 or less, the report may be typed or clearly handwritten using Form SBE 148 for submittal to the District Engineer for District Eight.
- b.) For contractors having IDOT contracts valued in the aggregate at more than \$250,000, the report must be submitted in a specific "Fixed Length Comma Delimited ASCII Text File Format". The subject file format is detailed on the next page. Submittal of this file may be by 3.5 inch disk or by e-mail.

**II. Monthly Contract Activity Report, Form SBE 248**

The prime contractor and each subcontractor shall submit a monthly report directly to the District Engineer, reflecting their contract activity on all Illinois Department of Transportation contracts they have in force in District Eight.

This report shall be submitted for each consecutive month, from the start, to the completion of all contracts in District Eight.

The report must be received in the District Office no later than the tenth day of the next month.

(1)

## Monthly Labor Summary and Activity Reporting System Codes and Formats

Indicated below for your reference are the Employee Codes and File Formats required for this system.

### I.) Monthly Labor Summary Report, Form SBE 148

The following employee codes are to be used to identify each individual on the Summary Report:

- |    |                      |  |   |
|----|----------------------|--|---|
| 1. | Gender:              | M - Male   | F - Female  |
| 2. | Ethnic Group:        | 1 - White<br>4 - American Indian/Alaskan Native  | 2 - Black<br>5 - Asian/Pacific Islander   |
| 3. | Work Classification: | OF - Official<br>CL - Clerical<br>TD - Truck Driver<br>EL - Electrician<br>CM - Cement Mason | SU - Supervisor<br>EO - Operator<br>PA - Painter<br>TE - Technical<br>FO - Foremen<br>ME - Mechanic<br>OT - Other<br>LA - Laborer |
| 4. | Employee Status:     | J - Journeyman<br>A - Apprentice   | O - Owner-Operator<br>T - Trainee<br>C - Company  |

Specific "Fixed Length Comma Delimited ASCII File Format"

Order	Field Name	Type	Size
1	Contractor Number	N	4
2	Contractor Reference Number	N	6
3	Contract Number	N	5
4	Period (07/28/2000)	D	10
5	SSN (111-11-1111)	N	11
6	Name	A	40
7	Gender	A	1
8	Ethnic Group	N	1
9	Work Classification	A	2
10	Employee Status	A	1
11	Total Hours (0000060.00)	N	10

File Name Conventions: (Contractor Number + Report Month/Year).Txt  
i.e. 20001298.Txt

### II.) Monthly Contract Activity Report, Form SBE 248

The following activity codes are to be used to identify the contractors contract status each month on the Monthly Activity Report, Form SBE 248:

- A. Contract Status: 1 - Not Started 2 - Active 3 - No Work 4 - Suspended 5 - Complete

Failure to comply with this special provision may result in the withholding of payments to the contractor, and/or cancellation, termination, or suspension of the contract in whole or part.

Compliance with this Special Provision shall be considered incidental to the cost of the contract and no additional compensation will be allowed for any costs incurred.

All prime and subcontractors having contracts in the aggregate exceeding \$250,000 must provide a "Fixed Length Comma Delimited ASCII File" for approval prior to the start of construction.

This Special Provision must be included in each subcontract agreement.

monitor/molassp2



**Illinois Department  
of Transportation**

**Storm Water Pollution Prevention Plan**

Route \_\_\_\_\_  
Section 06-00026-00-PK; 06-00026-01-MS  
County MADISON

Marked Rt. \_\_\_\_\_  
Project No. SBIL-0300(009)TE-D008(113)  
Contract No. 97301

This plan has been prepared to comply with the provisions of the NPDES Permit Number ILR10, issued by the Illinois Environmental Protection Agency on May 30, 2003 for storm water discharges from Construction Site Activities. This plan has also been prepared to comply with the provisions of NPDES Permit Number ILR40 for discharges from small municipal separate storm sewer systems if checked below.

NPDES permits associated with this project:

- ILR10 Permit No. (if applicable): \_\_\_\_\_
- ILR40 Permit No. (if applicable): \_\_\_\_\_

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

William E. Moore, Jr.  
Print Name  
President  
Title  
Village of Hartford  
Agency

*William E. Moore Jr*  
Signature  
12-10-07  
Date

**I. Site Description:**

A. The following is a description of the project location:

The "Lewis and Clark Memorial Tower", located on Confluence Tower Drive, Hartford, IL.

B. The following is a description of the construction activity which is the subject of this plan:

Viewing Tower, Visitors Center Office, Restrooms and Gift Shop, Bike Trail access path, Sidewalks and Parking Lot.

C. The following is a description of the intended sequence of major activities which will disturb soils for major portions of the construction site, such as grubbing, excavation and grading:

Excavation and Embankment, Temporary Seeding, Placement of other Erosion Control, Building, Parking Lot with Curb, Culverts, Sidewalk, Permanent Seeding, Signing, Pavement Marking and other Miscellaneous items.

D. The total area of the construction site is estimated to be 5.0 acres.

The total area of the site that is estimated will be disturbed by excavation, grading or other activities is 4.2 acres.

0.70

- F. The following is a description of the soil types found at the project site followed by information regarding their erosivity:

Landes Variant, very fine sandy loam

- G. The following is a description of potentially erosive areas associated with this project:

Building side slopes, Bike Trail access path side slopes.

- H. The following is a description of soil disturbing activities, their locations, and their erosive factors (e.g. steepness of slopes, length of slopes, etc):

Building side slopes, Bike Trail access path fill along existing levee with 3:1 side slopes for 30 feet.

- I. See the erosion control plans and/or drainage plans for this contract for information regarding drainage patterns, approximate slopes anticipated before and after major grading activities, locations where vehicles enter or exit the site and controls to prevent offsite sediment tracking (to be added after contractor identifies locations), areas of soil disturbance, the location of major structural and non-structural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters (including wetlands) and locations where storm water is discharged to surface water including wetlands.

- J. The following is a list of receiving water(s) and the ultimate receiving water(s), and areal extent of wetland acreage at the site. The location of the receiving waters can be found on the erosion and sediment control plans:

Overland drainage ditch draining under levee, to the Mississippi River.

- K. The following pollutants of concern will be associated with this construction project:

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Soil Sediment             | <input type="checkbox"/> Petroleum (gas, diesel, oil, kerosene, hydraulic oil / fluids) |
| <input checked="" type="checkbox"/> Concrete                  | <input type="checkbox"/> Antifreeze / Coolants  |
| <input checked="" type="checkbox"/> Concrete Truck Waste      | <input type="checkbox"/> Waste water from cleaning construction equipment               |
| <input checked="" type="checkbox"/> Concrete Curing Compounds | <input type="checkbox"/> Other (specify)  |
| <input checked="" type="checkbox"/> Solid Waste Debris        | <input type="checkbox"/> Other (specify)  |
| <input type="checkbox"/> Paints                               | <input type="checkbox"/> Other (specify)  |
| <input type="checkbox"/> Solvents                             | <input type="checkbox"/> Other (specify)  |
| <input checked="" type="checkbox"/> Fertilizers / Pesticides  | <input type="checkbox"/> Other (specify)  |

## II. Controls:

This section of the plan addresses the controls that will be implemented for each of the major construction activities described in I.C. above and for all use areas, borrow sites, and waste sites. For each measure discussed, the contractor will be responsible for its implementation as indicated. The contractor shall provide to the resident engineer a plan for the implementation of the measures indicated. The contractor, and subcontractors, will notify the resident engineer of any proposed changes, maintenance, or modifications to keep construction activities compliant with the permit. Each such contractor has signed the required certification on forms which are attached to, and are a part of, this plan:

### A. Erosion and Sediment Controls

- 1. Stabilized Practices:** Provided below is a description of interim and permanent stabilization practices, including site specific scheduling of the implementation of the practices. Site plans will ensure that existing vegetation is preserved where attainable and disturbed portions of the site will be stabilized. Stabilization practices may include but are not limited to: temporary seeding, permanent seeding, mulching, geotextiles, sodding, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Except as provided below in II(A)(1)(a) and II(A)(3), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the

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site has temporarily or permanently ceases on all disturbed portions of the site where construction will not occur for a period of 21 or more calendar days.

- a. Where the initiation of stabilization measures by the 14<sup>th</sup> day after construction activity temporarily or permanently ceases is precluded by snow cover, stabilization measures shall be initiated as soon as practicable thereafter.

The following Stabilization Practices will be used for this project:

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> Preservation of Mature Vegetation | <input checked="" type="checkbox"/> Erosion Control Blanket / Mulching |
| <input type="checkbox"/> Vegetated Buffer Strips                      | <input checked="" type="checkbox"/> Sodding                            |
| <input type="checkbox"/> Protection of Trees                          | <input type="checkbox"/> Geotextiles                                   |
| <input checked="" type="checkbox"/> Temporary Erosion Control Seeding | <input type="checkbox"/> Other (specify)                               |
| <input type="checkbox"/> Temporary Turf (Seeding, Class 7)            | <input type="checkbox"/> Other (specify)                               |
| <input type="checkbox"/> Temporary Mulching                           | <input type="checkbox"/> Other (specify)                               |
| <input checked="" type="checkbox"/> Permanent Seeding                 | <input type="checkbox"/> Other (specify)                               |

Describe how the Stabilization Practices listed above will be utilized:

Areas of existing vegetation outside the proposed construction limits shall be identified and shall be protected from construction activities. Dead, diseased, or unsuitable vegetation within the site shall be removed. Bare and sparsely vegetated ground in highly erodible areas, shall be temporarily seeded at the beginning of construction where no construction activities are expected. Areas which are highly erodible shall be temporarily seeded when no construction activities are expected.

2. **Structural Practices:** Provided below is a description of structural practices that will be implemented, to the degree attainable, to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Such practices may include but are not limited to: perimeter erosion barrier, earth dikes, drainage swales, sediment traps, ditch checks, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. The installation of these devices may be subject to Section 404 of the Clean Water Act.

The following Structural Practices will be used for this project:

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> Perimeter Erosion Barrier     | <input type="checkbox"/> Rock Outlet Protection                             |
| <input checked="" type="checkbox"/> Temporary Ditch Check         | <input checked="" type="checkbox"/> Riprap                                  |
| <input type="checkbox"/> Storm Drain Inlet Protection             | <input type="checkbox"/> Gabions  |
| <input type="checkbox"/> Sediment Trap                            | <input type="checkbox"/> Slope Mattress                                     |
| <input type="checkbox"/> Temporary Pipe Slope Drain               | <input type="checkbox"/> Retaining Walls                                    |
| <input type="checkbox"/> Temporary Sediment Basin                 | <input type="checkbox"/> Slope Walls  |
| <input type="checkbox"/> Temporary Stream Crossing                | <input type="checkbox"/> Concrete Revetment Mats                            |
| <input checked="" type="checkbox"/> Stabilized Construction Exits | <input type="checkbox"/> Level Spreaders                                    |
| <input type="checkbox"/> Turf Reinforcement Mats                  | <input checked="" type="checkbox"/> Other (specify) Erosion Control Blanket |
| <input type="checkbox"/> Permanent Check Dams                     | <input type="checkbox"/> Other (specify)                                    |
| <input type="checkbox"/> Permanent Sediment Basin                 | <input type="checkbox"/> Other (specify)                                    |
| <input type="checkbox"/> Aggregate Ditch                          | <input type="checkbox"/> Other (specify)                                    |
| <input checked="" type="checkbox"/> Paved Ditch                   | <input type="checkbox"/> Other (specify)                                    |

Describe how the Structural Practices listed above will be utilized:

Where water drains away from the project, temporary ditch checks and perimeter erosion barrier shall be installed. Where a significant amount of water drains into the construction zone from outside areas (adjacent landowners), temporary ditch checks will be utilized to locally divert water, reduce flow rates, and collect outside siltation. Erosion control blanket will used to encourage turf growth on the levee.

3. **Storm Water Management:** Provided below is a description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. The installation of these devices may be subject to Section 404 of the Clean Water Act.



- a. Such practices may include but are not limited to: storm water detention structures (including wet ponds), storm water retention structures, flow attenuation by use of open vegetated swales and natural depressions, infiltration of runoff on site, and sequential systems (which combine several practices).

The practices selected for implementation were determined on the basis of the technical guidance in Section 59-8 (Erosion and Sediment Control) in Chapter 59 (Landscape Design and Erosion Control) of the Illinois Department of Transportation Bureau of Design and Environment Manual. If practices other than those discussed in Section 59-8 are selected for implementation or if practices are applied to situations different from those covered in Section 59-8, the technical basis for such decisions will be explained below.

- b. Velocity dissipation devices will be placed at discharge locations and along the length of any outfall channel as necessary to provide a non-erosive velocity flow from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected (e.g. maintenance of hydrologic conditions such as the hydroperiod and hydrodynamics present prior to the initiation of construction activities).

#### Description of Storm Water Management Controls.

No additional runoff will be created as a result of this project. Proposed ditches only re-establish existing ditches that do not flow properly. All permanent ditches will be sodded to provide a vegetative channel to filter storm water. Velocity dissipation devices (i.e., riprap) will be placed at the outfall of all existing/proposed pipe culverts and all existing/proposed outfalls draining from the project as necessary to provide non-erosive velocity flow from the structure.

#### 4. Other Controls:

- a. Vehicle Entrances and Exits – Stabilized construction entrances and exits must be constructed to prevent tracking of sediments onto roadways.

The contractor will provide the resident engineer with a written plan identifying the location of stabilized entrances and exits and the procedures (s)he will use to construct and maintain them.

- b. Material Delivery, Storage, and Use – The following BMPs shall be implemented to help prevent discharges of construction materials during delivery, storage, and use:
  - All products delivered to the project site must be properly labeled.
  - Water tight shipping containers and/or semi trailers shall be used to store hand tools, small parts, and most construction materials that can be carried by hand, such as paint cans, solvents, and grease.
  - A storage/containment facility should be chosen for larger items such as drums and items shipped or stored on pallets. Such material is to be covered by a tin roof or large sheets of plastic to prevent precipitation from coming in contact with the products being stored.
  - Large items such as light stands, framing materials and lumber shall be stored in the open in a general storage area. Such material shall be elevated with wood blocks to minimize contact with storm water runoff.
  - Spill clean-up materials, material safety data sheets, an inventory of materials, and emergency contact numbers shall be maintained and stored in one designated area and each Contractor is to inform his/her employees and the resident engineer of this location.
- c. Stockpile Management – BMPs shall be implemented to reduce or eliminate pollution of storm water from stockpiles of soil and paving materials such as but not limited to portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, aggregate sub base, and pre-mixed aggregate. The following BMPs may be considered:
  - Perimeter Erosion Barrier
  - Temporary Seeding
  - Temporary Mulch
  - Plastic Covers
  - Soil Binders
  - Storm Drain Inlet Protection

The contractor will provide the resident engineer with a written plan of the procedures (s)he will use on the project and how they will be maintained.

- d. Waste Disposal. No materials, including building materials, shall be discharged into Waters of the State, except as authorized by a Section 404 permit.
- e. The provisions of this plan shall ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations.
- f. The contractor shall provide a written and graphic plan to the resident engineer identifying where each of the above areas will be located and how they are to be managed.

### 5. Approved State or Local Laws

The management practices, controls and provisions contained in this plan will be in accordance with IDOT specifications, which are at least as protective as the requirements contained in the Illinois Environmental Protection Agency's Illinois Urban Manual, 1995. Procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials shall be described or incorporated by reference in the space provided below. Requirements specified in sediment and erosion site plans, site permits, storm water management site plans or site permits approved by local officials that are applicable to protecting surface water resources are, upon submittal of an NOI, to be authorized to discharge under permit ILR10 incorporated by reference and are enforceable under this permit even if they are not specifically included in the plan.

Description of procedures and requirements specified in applicable sediment and erosion site plans or storm water management plans approved by local officials:

None

### III. Maintenance:

The following is a description of procedures that will be used to maintain, in good and effective operating conditions, the vegetation, erosion and sediment control measures and other protective measures identified in this plan. The resident engineer will provide maintenance guides to the contractor for the practices associated with this project.

Vegetated slopes/channels will be maintained by periodic mowing during the growing season. The project will be inspected periodically according to the following inspection intervals to ensure that erosion control measures are operating correctly and to ensure that major erosion is not occurring. Adjustments to erosion control items, shall be made within seven calendar days or no additional work on the project will be permitted until the needed corrective measures have been taken.

### IV. Inspections:

Qualified personnel shall inspect disturbed areas of the construction site which have not yet been finally stabilized, structural control measures, and locations where vehicles and equipment enter and exit the site. Such inspections shall be conducted at least once every seven (7) calendar days and within 24 hours of the end of a storm that is 0.5 inches or greater or equivalent snowfall.

- A. Disturbed areas, use areas (storage of materials, stockpiles, machine maintenance, fueling, etc.), borrow sites, and waste sites shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures identified in the plan shall be observed to ensure that they are operating correctly. Discharge locations or points that are accessible, shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles enter or exit the site shall be inspected for evidence of off site sediment tracking.
- B. Based on the results of the inspection, the description of potential pollutant sources identified in section I above and pollution prevention measures identified in section II above shall be revised as appropriate as soon as practicable after such inspection. Any changes to this plan resulting from the required inspections shall be implemented within ½ hour to 1 week based on the urgency of the situation. The resident engineer will notify the contractor of the time required to implement such actions through the weekly inspection report.

- C. A report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of this storm water pollution prevention plan, and actions taken in accordance with section IV(B) shall be made and retained as part of the plan for at least three (3) years after the date of the inspection. The report shall be signed in accordance with Part VI. G of the general permit.
- D. If any violation of the provisions of this plan is identified during the conduct of the construction work covered by this plan, the resident engineer shall complete and file an "Incidence of Noncompliance" (ION) report for the identified violation. The resident engineer shall use forms provided by the Illinois Environmental Protection Agency and shall include specific information on the cause of noncompliance, actions which were taken to prevent any further causes of noncompliance, and a statement detailing any environmental impact which may have resulted from the noncompliance. All reports of noncompliance shall be signed by a responsible authority in accordance with Part VI. G of the general permit.

The Incidence of Non-Compliance shall be mailed to the following address:

Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Attn: Compliance Assurance Section  
1021 North Grand East  
Post Office Box 19276  
Springfield, Illinois 62794-9276

#### V. Non-Storm Water Discharges:

Except for flows from fire fighting activities, sources of non-storm water that is combined with storm water discharges associated with the industrial activity addressed in this plan must be described below. Appropriate pollution prevention measures, as described below, will be implemented for the non-storm water component(s) of the discharge.

- A. Spill Prevention and Control – BMPs shall be implemented to contain and clean-up spills and prevent material discharges to the storm drain system. The contractor shall produce a written plan stating how his/her company will prevent, report, and clean up spills and provide a copy to all of his/her employees and the resident engineer. The contractor shall notify all of his/her employees on the proper protocol for reporting spills. The contractor shall notify the resident engineer of any spills immediately.
- B. Concrete Residuals and Washout Wastes – The following BMPs shall be implemented to control residual concrete, concrete sediments, and rinse water:
- Temporary Concrete Washout Facilities shall be constructed for rinsing out concrete trucks. Signs shall be installed directing concrete truck drivers where designated washout facilities are located.
  - The contractor shall have the location of temporary concrete washout facilities approved by the resident engineer.
  - All temporary concrete washout facilities are to be inspected by the contractor after each use and all spills must be reported to the resident engineer and cleaned up immediately.
  - Concrete waste solids/liquids shall be disposed of properly.
- C. Litter Management – A proper number of dumpsters shall be provided on site to handle debris and litter associated with the project. The Contractor is responsible for ensuring his/her employees place all litter including marking paint cans, soda cans, food wrappers, wood lathe, marking ribbon, construction string, and all other construction related litter in the proper dumpsters.
- D. Vehicle and Equipment Cleaning – Vehicles and equipment are to be cleaned in designated areas only, preferably off site.
- E. Vehicle and Equipment Fueling – A variety of BMPs can be implemented during fueling of vehicles and equipment to prevent pollution. The contractor shall inform the resident engineer as to which BMPs will be used on the project. The contractor shall inform the resident engineer how (s)he will be informing his/her employees of these BMPs (i.e. signs, training, etc.). Below are a few examples of these BMPs:
- Containment

- Spill Prevention and Control
- Use of Drip Pans and Absorbents
- Automatic Shut-Off Nozzles
- Topping Off Restrictions
- Leak Inspection and Repair

F. Vehicle and Equipment Maintenance – On site maintenance must be performed in accordance with all environmental laws such as proper storage and no dumping of old engine oil or other fluids on site.

**VI. Failure to Comply:**

Failure to comply with any provisions of this Storm Water Pollution Prevention Plan will result in the implementation of an Erosion and Sediment Control Deficiency Deduction against the contractor and/or penalties under the NPDES permit which could be passed onto the contractor.



**Illinois Department  
of Transportation**

**Contractor Certification Statement**

This certification statement is part of the Storm Water Pollution Prevention Plan for the project described below, in accordance with NPDES Permit No. ILR10 issued by the Illinois Environmental Protection Agency on May 30, 2003.

Route _____	Marked Rt. _____
Section <u>06-00026-00-PK;06-00026-01-MS</u>	Project No. <u>SBIL-0300(009);TE-D008(113)</u>
County <u>MADISON</u>	Contract No. <u>97301</u>

I certify under penalty of law that I understand the terms of the general National Pollutant Discharge Elimination System (NPDES) permit (ILR 10) that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification. I have read and understand all of the information and requirements stated in the Storm Water Pollution Prevention Plan for the above mentioned project. I have provided all documentation required to be in compliance with the ILR10 and Storm Water Pollution Prevention Plan and will provide timely updates to these documents as necessary.

Contractor

Sub-Contractor

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Name of Firm

\_\_\_\_\_  
Telephone

\_\_\_\_\_  
Street Address

\_\_\_\_\_  
City/State/ZIP

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY  
NOTICE OF INTENT (NOI)  
GENERAL PERMIT TO DISCHARGE STORM WATER  
CONSTRUCTION SITE ACTIVITIES**

**OWNER INFORMATION**

NAME:	LAST HARTFORD,	FIRST VILLAGE OF	MIDDLE (OR COMPANY NAME)	OWNER TYPE: City
MAILING ADDRESS:	140 WEST HAWTHORNE			
CITY:	HARTFORD		STATE: IL	ZIP: 62048
CONTACT PERSON:	WILLIAM E. MOORE, JR.		TELEPHONE NUMBER:	AREA CODE 618 NUMBER 251-2681

**CONTRACTOR INFORMATION**

NAME:	LAST	FIRST	MIDDLE	(OR COMPANY NAME)	TELEPHONE NUMBER:	AREA CODE	NUMBER
MAILING ADDRESS:	CITY:			STATE:	ZIP:		

**CONSTRUCTION SITE INFORMATION**

SELECT ONE:	<input checked="" type="checkbox"/> New Site <input type="checkbox"/> CHANGE OF INFORMATION TO PERMIT NO. ILR10_____								
FACILITY NAME:	LEWIS & CLARK TOWER PROJECT			OTHER NPDES PERMIT NOS.:					
FACILITY LOCATION:	HARTFORD, VILLAGE OF			TELEPHONE NUMBER:	AREA CODE 618	NUMBER 251-2681			
CITY:	HARTFORD	ST:	IL	ZIP:	62048	LATITUDE:	38 48 39	LONGITUDE:	90 06 02
COUNTY:	MADISON		SECTION:	9	TOWNSHIP:	4 N		RANGE:	9 W
APPROX. CONST. START DATE:	04 / 01 / 08		APPROX. CONSTRUCTION END DATE:	04 / 01 / 09		TOTAL SIZE OF CONSTRUCTION SITE IN ACRES:		5	
STORM WATER POLLUTION PREVENTION PLAN COMPLETED <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (If no, separate notification required to Agency prior to construction.)									

**TYPE OF CONSTRUCTION**

Other	TYPE BRIEF DESCRIPTION OF PROJECT: CONSTRUCTION OF TOWER SUPPORT BUILDINGS, BIKE TRAIL & PARKING LOT
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**HISTORIC PRESERVATION AND ENDANGERED SPECIES COMPLIANCE**

HAS THIS PROJECT SATISFIED APPLICABLE REQUIREMENTS FOR COMPLIANCE WITH ILLINOIS LAW ON:			
HISTORIC PRESERVATION	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	
ENDANGERED SPECIES	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO	

**RECEIVING WATER INFORMATION**

DOES YOUR STORM WATER DISCHARGE DIRECTLY TO:	OWNER OF STORM SEWER SYSTEM:
<input checked="" type="checkbox"/> WATERS OF THE STATE    OR <input type="checkbox"/> STORM SEWER	
NAME OF CLOSEST RECEIVING WATER:	FIELD DRAINAGE DITCH TRIBUTARY TO MISSISSIPPI RIVER

I certify under penalty of law that this document and all attachments were prepared under my direction and supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage this system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. In addition, I certify that the provisions of the permit, including the development and implementation of a storm water pollution prevention plan and a monitoring program plan, will be complied with.

OWNER SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

FOR OFFICE USE ONLY

MAIL COMPLETED FORM TO:  (DO NOT SUBMIT ADDITIONAL DOCUMENTATION UNLESS REQUESTED)	ILLINOIS ENVIRONMENTAL PROTECTION AGENCY DIVISION OF WATER POLLUTION CONTROL ATTN: PERMIT SECTION POST OFFICE BOX 19276 SPRINGFIELD, ILLINOIS 62794-9276 <a href="http://www.epa.state.il.us">www.epa.state.il.us</a>	LOG:  PERMIT NO. ILR10  DATE:
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Information required by this form must be provided to comply with 415 ILCS 5/39 (1996). Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

**INSTRUCTIONS FOR COMPLETION OF CONSTRUCTION ACTIVITY NOTICE OF INTENT (NOI)  
FORM**

Please adhere to the following instructions:

Submit original, photocopy or facsimile copies. Facsimile and/or photo copies should be followed-up with an original signature copy as soon as possible. Please write "copy" under the "For Office Use Only" box in the lower right hand corner.

•••• Submit completed forms to:

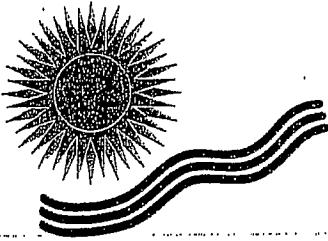
Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Permit Section  
Post Office Box 19276  
Springfield, Illinois 62794-9276  
or call (217)782-0610  
[www.epa.state.il.us](http://www.epa.state.il.us)

- Reports must be typed or printed legibly and signed.
- Any facility that is not presently covered by the ILR10 Construction Activity Storm Water Discharge General Permit is considered a new facility.
- If this is a change in your facility information, renewal, etc., please fill in your permit number on the appropriate line.
- **NOTE: FACILITY LOCATION IS NOT NECESSARILY THE FACILITY MAILING ADDRESS, BUT SHOULD DESCRIBE WHERE THE FACILITY IS LOCATED.**

•••• Use the formats given in the following examples for correct form completion.

	<u>Example</u>	<u>Format</u>
SECTION	12	1 or 2 numerical digits
TOWNSHIP	12N	1 or 2 numerical digits followed by "N" or "S"
RANGE	12W	1 or 2 numerical digits followed by "E" or "W"

- For the Name of Closest Receiving Waters, do not use terms such as ditch or channel. For unnamed tributaries, use terms which include at least a named main tributary such as "Unnamed Tributary to Sugar Creek to Sangamon River."
- Submit a fee of \$500 prior to the Notice of Intent being considered complete for coverage by the ILR10 General Permits. Please make checks payable to: Illinois EPA



**Wood River Drainage and Levee District**  
 543 W. Madison Avenue • Wood River, IL 62095

**LICENSE TO ENTER LEVEE DISTRICT PROPERTY**  
 The Wood River Drainage and Levee District hereby licenses to

Name: Deanna Barnes  
 Company: Village of Hartford  
 Address: 140 W. Hawthorne Avenue  
 City: Hartford State: IL Zip: 62048  
 Phone: 618-251-2681 x15 Date project to start October 2007

to enter upon any Levee District property or levee to install biketrail  
at Lewis + Clark Confluence Tower

This is done with the expectation that the licensee will obtain proper easements from any owner of any underlying fee and that Court action will be necessary to effect a permanent easement.

The Licensee agrees to restore the property at the end of the activity to the condition it was prior to the above activity and save harmless the Levee District any and all claims arising from any other parties due to the aforesaid project.

IN WITNESS WHEREOF, the parties have set their signatures on the 7<sup>th</sup> Day  
 of August 2007.

WOOD RIVER DRAINAGE & LEVEE DISTRICT

By Geroy Emirecki  
 President of the Board

Attest:

Judy Beckham  
 Secretary

By Deanna Barnes  
 Applicant

Good during daylight hours only. No firearms allowed.  
 This permit will expire on 7 Aug 1 2008

State of Illinois  
Department of Transportation  
Bureau of Local Roads and Streets

SPECIAL PROVISION  
FOR  
INSURANCE

Effective: February 1, 2007  
Revised: August 1, 2007

All references to Sections or Articles in this specification shall be construed to mean specific Section or Article of the Standard Specifications for Road and Bridge Construction, adopted by the Department of Transportation.

The Contractor shall name the following entities as additional insured under the Contractor's general liability insurance policy in accordance with Article 107.27:

Village of Hartford, IL

Blotevogel Associates, Inc.

S.S.E., Inc.

Kennedy Associates, Inc.

The entities listed above and their officers, employees, and agents shall be indemnified and held harmless in accordance with Article 107.26.



## **CEMENT (BDE)**

Effective: January 1, 2007

Revised: November 1, 2007

Revise Section 1001 of the Standard Specifications to read:

### **"SECTION 1001. CEMENT**

**1001.01 Cement Types.** Cement shall be according to the following.

- (a) Portland Cement. Acceptance of portland cement shall be according to the current Bureau of Materials and Physical Research's Policy Memorandum, "Portland or Blended Cement Acceptance Procedure for Qualified and Non-Qualified Plants".

Portland cement shall be according to ASTM C 150, and shall meet the standard physical and chemical requirements. Type I or Type II may be used for cast-in-place, precast, and precast prestressed concrete. Type III may be used according to Article 1020.04, or when approved by the Engineer. All other cements referenced in ASTM C 150 may be used when approved by the Engineer.

The total of all organic processing additions shall be a maximum of 1.0 percent by weight (mass) of the cement and the total of all inorganic processing additions shall be a maximum of 4.0 percent by weight (mass) of the cement. Organic processing additions shall be limited to grinding aids that improve the flowability of cement, reduce pack set, and improve grinding efficiency. Inorganic processing additions shall be limited to granulated blast-furnace slag according to the chemical requirements of AASHTO M 302 and Class C fly ash according to the chemical requirements of AASHTO M 295.

- (b) Portland-Pozzolan Cement. Acceptance of portland-pozzolan cement shall be according to the current Bureau of Materials and Physical Research's Policy Memorandum, "Portland or Blended Cement Acceptance Procedure for Qualified and Non-Qualified Plants".

Portland-pozzolan cement shall be according to ASTM C 595 and shall meet the standard physical and chemical requirements. Type IP or I(PM) may be used for cast-in-place, precast, and precast prestressed concrete, except when Class PP concrete is used. The pozzolan constituent for Type IP shall be a maximum of 21 percent of the weight (mass) of the portland-pozzolan cement. All other cements referenced in ASTM C 595 may be used when approved by the Engineer.

For cast-in-place construction, portland-pozzolan cements shall not be used in concrete mixtures when the air temperature is below 40 °F (4 °C) without permission of the Engineer. If permission is given, the mix design strength requirement may require the Contractor to increase the cement or eliminate the cement factor reduction for a water-

reducing or high range water-reducing admixture which is permitted according to Article 1020.05(b).

The total of all organic processing additions shall be a maximum of 1.0 percent by weight (mass) of the cement. Organic processing additions shall be limited to grinding aids as defined in (a) above. Inorganic processing additions shall not be used.

- (c) Portland Blast-Furnace Slag Cement. Acceptance of portland blast-furnace slag cement shall be according to the current Bureau of Materials and Physical Research's Policy Memorandum, "Portland or Blended Cement Acceptance Procedure for Qualified and Non-Qualified Plants".

Portland blast-furnace slag cement shall be according to ASTM C 595 and shall meet the standard physical and chemical requirements. Type I(SM) slag-modified portland cement may be used for cast-in-place, precast, and precast prestressed concrete, except when Class PP concrete is used. All other cements referenced in ASTM C 595 may be used when approved by the Engineer.

For cast-in-place construction, portland blast-furnace slag cements shall not be used in concrete mixtures when the air temperature is below 40 °F (4 °C) without permission of the Engineer. If permission is given, the mix design strength requirement may require the Contractor to increase the cement or eliminate the cement factor reduction for a water-reducing or high range water-reducing admixture which is permitted according to Article 1020.05(b).

The total of all organic processing additions shall be a maximum of 1.0 percent by weight (mass) of the cement. Organic processing additions shall be limited to grinding aids as defined in (a) above. Inorganic processing additions shall not be used.

- (d) Rapid Hardening Cement. Rapid hardening cement shall be used according to Article 1020.04 or when approved by the Engineer. The cement shall be on the Department's current "Approved List of Packaged, Dry, Rapid Hardening Cementitious Materials for Concrete Repairs", and shall be according to the following.

(1) The cement shall have a maximum final set of 25 minutes, according to Illinois Modified ASTM C 191.

(2) The cement shall have a minimum compressive strength of 2000 psi (13,800 kPa) at 3.0 hours, and 4000 psi (27,600 kPa) at 24.0 hours, according to Illinois Modified ASTM C 109.

(3) The cement shall have a maximum drying shrinkage of 0.050 percent at seven days, according to Illinois Modified ASTM C 596.

(4) The cement shall have a maximum expansion of 0.020 percent at 14 days, according to Illinois Modified ASTM C 1038.

(5) The cement shall have a minimum 80 percent relative dynamic modulus of elasticity; and shall not have a weight (mass) gain in excess of 0.15 percent or a weight (mass) loss in excess of 1.0 percent, after 100 cycles, according to Illinois Modified AASHTO T 161, Procedure B. At 100 cycles, the specimens are measured and weighed at 73 °F (23 °C).

(e) Calcium Aluminate Cement. Calcium aluminate cement shall be used when specified by the Engineer. The cement shall meet the standard physical requirements for Type I cement according to ASTM C 150, except the time of setting shall not apply. The chemical requirements shall be determined according to ASTM C 114 and shall be as follows: minimum 38 percent aluminum oxide ( $Al_2O_3$ ), maximum 42 percent calcium oxide (CaO), maximum 1 percent magnesium oxide (MgO), maximum 0.4 percent sulfur trioxide ( $SO_3$ ), maximum 1 percent loss on ignition, and maximum 3.5 percent insoluble residue.

**1001.02 Uniformity of Color.** Cement contained in single loads or in shipments of several loads to the same project shall not have visible differences in color.

**1001.03 Mixing Brands and Types.** Different brands or different types of cement from the same manufacturing plant, or the same brand or type from different plants shall not be mixed or used alternately in the same item of construction unless approved by the Engineer.

**1001.04 Storage.** Cement shall be stored and protected against damage, such as dampness which may cause partial set or hardened lumps. Different brands or different types of cement from the same manufacturing plant, or the same brand or type from different plants shall be kept separate."

80166

## **DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION (BDE)**

Effective: September 1, 2000

Revised: January 1, 2007

FEDERAL OBLIGATION. The Department of Transportation, as a recipient of federal financial assistance, is required to take all necessary and reasonable steps to ensure nondiscrimination in the award and administration of contracts. Consequently, the federal regulatory provisions of 49 CFR part 26 apply to this contract concerning the utilization of disadvantaged business enterprises. For the purposes of this Special Provision, a disadvantaged business enterprise (DBE) means a business certified by the Department in accordance with the requirements of 49 CFR part 26 and listed in the DBE Directory or most recent addendum.

STATE OBLIGATION. This Special Provision will also be used by the Department to satisfy the requirements of the Business Enterprise for Minorities, Females, and Persons with Disabilities Act, 30 ILCS 575. When this Special Provision is used to satisfy state law requirements on 100 percent state-funded contracts, the federal government has no involvement in such contracts (not a federal-aid contract) and no responsibility to oversee the implementation of this Special Provision by the Department on those contracts. DBE participation on 100 percent state-funded contracts will not be credited toward fulfilling the Department's annual overall DBE goal required by the US Department of Transportation to comply with the federal DBE program requirements.

CONTRACTOR ASSURANCE. The Contractor makes the following assurance and agrees to include the assurance in each subcontract that the Contractor signs with a subcontractor:

The Contractor, subrecipient, or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of contracts funded in whole or in part with federal or state funds. Failure by the Contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate.

OVERALL GOAL SET FOR THE DEPARTMENT. As a requirement of compliance with 49 CFR part 26, the Department has set an overall goal for DBE participation in its federally assisted contracts. That goal applies to all federal-aid funds the Department will expend in its federally assisted contracts for the subject reporting fiscal year. The Department is required to make a good faith effort to achieve the overall goal. The dollar amount paid to all approved DBE firms performing work called for in this contract is eligible to be credited toward fulfillment of the Department's overall goal.

CONTRACT GOAL TO BE ACHIEVED BY THE CONTRACTOR. This contract includes a specific DBE utilization goal established by the Department. The goal has been included because the Department has determined that the work of this contract has subcontracting opportunities that may be suitable for performance by DBE companies. This determination is based on an assessment of the type of work, the location of the work, and the availability of

DBE companies to do a part of the work. The assessment indicates that, in the absence of unlawful discrimination, and in an arena of fair and open competition, DBE companies can be expected to perform 10.0 % of the work. This percentage is set as the DBE participation goal for this contract. Consequently, in addition to the other award criteria established for this contract, the Department will award this contract to a bidder who makes a good faith effort to meet this goal of DBE participation in the performance of the work. A bidder makes a good faith effort for award consideration if either of the following is done in accordance with the procedures set forth in this Special Provision:

- (a) The bidder documents that firmly committed DBE participation has been obtained to meet the goal; or
- (b) The bidder documents that a good faith effort has been made to meet the goal, even though the effort did not succeed in obtaining enough DBE participation to meet the goal.

DBE LOCATOR REFERENCES. Bidders may consult the DBE Directory as a reference source for DBE companies certified by the Department. In addition, the Department maintains a letting and item specific DBE locator information system whereby DBE companies can register their interest in providing quotes on particular bid items advertised for letting. Information concerning DBE companies willing to quote work for particular contracts may be obtained by contacting the Department's Bureau of Small Business Enterprises at telephone number (217)785-4611, or by visiting the Department's web site at [www.dot.il.gov](http://www.dot.il.gov).

BIDDING PROCEDURES. Compliance with the bidding procedures of this Special Provision is required prior to the award of the contract and the failure of the as-read low bidder to comply will render the bid not responsive.

- (a) In order to assure the timely award of the contract, the as-read low bidder shall submit a Disadvantaged Business Utilization Plan on Department form SBE 2026 within seven working days after the date of letting. To meet the seven day requirement, the bidder may send the Plan by certified mail or delivery service within the seven working day period. If a question arises concerning the mailing date of a Plan, the mailing date will be established by the U.S. Postal Service postmark on the original certified mail receipt from the U.S. Postal Service or the receipt issued by a delivery service. It is the responsibility of the bidder to ensure that the postmark or receipt date is affixed within the seven working days if the bidder intends to rely upon mailing or delivery to satisfy the submission day requirement. The Plan is to be submitted to the Department of Transportation, Bureau of Small Business Enterprises, Contract Compliance Section, 2300 South Dirksen Parkway, Room 319, Springfield, Illinois 62764 (Telefax: (217)785-1524). It is the responsibility of the bidder to obtain confirmation of telefax delivery. The Department will not accept a Utilization Plan if it does not meet the seven day submittal requirement and the bid will be declared not responsive. In the event the bid is declared not responsive due to a failure to submit a Plan or failure to comply with the bidding procedures set forth herein, the Department may elect to cause the forfeiture of the penal sum of the bidder's proposal guaranty, and may deny authorization to bid the

project if re-advertised for bids. The Department reserves the right to invite any other bidder to submit a Utilization Plan at any time for award consideration or to extend the time for award.

- (b) The Utilization Plan shall indicate that the bidder either has obtained sufficient DBE participation commitments to meet the contract goal or has not obtained enough DBE participation commitments in spite of a good faith effort to meet the goal. The Utilization Plan shall further provide the name, telephone number, and telefax number of a responsible official of the bidder designated for purposes of notification of plan approval or disapproval under the procedures of this Special Provision.
- (c) The Utilization Plan shall include a DBE Participation Commitment Statement, Department form SBE 2025, for each DBE proposed for the performance of work to achieve the contract goal. The signatures on these forms must be original signatures. All elements of information indicated on the said form shall be provided, including but not limited to the following:
  - (1) The name and address of each DBE to be used;
  - (2) A description, including pay item numbers, of the commercially useful work to be done by each DBE;
  - (3) The price to be paid to each DBE for the identified work specifically stating the quantity, unit price, and total subcontract price for the work to be completed by the DBE. If partial pay items are to be performed by the DBE, indicate the portion of each item, a unit price where appropriate and the subcontract price amount;
  - (4) A commitment statement signed by the bidder and each DBE evidencing availability and intent to perform commercially useful work on the project; and
  - (5) If the bidder is a joint venture comprised of DBE firms and non-DBE firms, the plan must also include a clear identification of the portion of the work to be performed by the DBE partner(s).
- (d) The contract will not be awarded until the Utilization Plan submitted by the bidder is approved. The Utilization Plan will be approved by the Department if the Plan commits sufficient commercially useful DBE work performance to meet the contract goal. The Utilization Plan will not be approved by the Department if the Plan does not commit sufficient DBE performance to meet the contract goal unless the bidder documents that it made a good faith effort to meet the goal. The good faith procedures of Section VIII of this special provision apply. If the Utilization Plan is not approved because it is deficient in a technical matter, unless waived by the Department, the bidder will be notified and will be allowed no less than a five working day period in order to cure the deficiency.

CALCULATING DBE PARTICIPATION. The Utilization Plan values represent work anticipated to be performed and paid for upon satisfactory completion. The Department is only able to

count toward the achievement of the overall goal and the contract goal the value of payments made for the work actually performed by DBE companies. In addition, a DBE must perform a commercially useful function on the contract to be counted. A commercially useful function is generally performed when the DBE is responsible for the work and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. The Department and Contractor are governed by the provisions of 49 CFR part 26.55(c) on questions of commercially useful functions as it affects the work. Specific counting guidelines are provided in 49 CFR part 26.55, the provisions of which govern over the summary contained herein.

- (a) DBE as the Contractor: 100 percent goal credit for that portion of the work performed by the DBE's own forces, including the cost of materials and supplies. Work that a DBE subcontracts to a non-DBE firm does not count toward the DBE goals.
- (b) DBE as a joint venture Contractor: 100 percent goal credit for that portion of the total dollar value of the contract equal to the distinct, clearly defined portion of the work performed by the DBE's own forces.
- (c) DBE as a subcontractor: 100 percent goal credit for the work of the subcontract performed by the DBE's own forces, including the cost of materials and supplies, excluding the purchase of materials and supplies or the lease of equipment by the DBE subcontractor from the prime Contractor or its affiliates. Work that a DBE subcontractor in turn subcontracts to a non-DBE firm does not count toward the DBE goal.
- (d) DBE as a trucker: 100 percent goal credit for trucking participation provided the DBE is responsible for the management and supervision of the entire trucking operation for which it is responsible. At least one truck owned, operated, licensed, and insured by the DBE must be used on the contract. Credit will be given for the full value of all such DBE trucks operated using DBE employed drivers. Goal credit will be limited to the value of the reasonable fee or commission received by the DBE if trucks are leased from a non-DBE company.
- (e) DBE as a material supplier:
  - (1) 60 percent goal credit for the cost of the materials or supplies purchased from a DBE regular dealer.
  - (2) 100 percent goal credit for the cost of materials or supplies obtained from a DBE manufacturer.
  - (3) 100 percent credit for the value of reasonable fees and commissions for the procurement of materials and supplies if not a regular dealer or manufacturer.

GOOD FAITH EFFORT PROCEDURES. If the bidder cannot obtain sufficient DBE commitments to meet the contract goal, the bidder must document in the Utilization Plan the good faith efforts made in the attempt to meet the goal. This means that the bidder must show

that all necessary and reasonable steps were taken to achieve the contract goal. Necessary and reasonable steps are those which could reasonably be expected to obtain sufficient DBE participation. The Department will consider the quality, quantity, and intensity of the kinds of efforts that the bidder has made. Mere *pro forma* efforts are not good faith efforts; rather, the bidder is expected to have taken those efforts that would be reasonably expected of a bidder actively and aggressively trying to obtain DBE participation sufficient to meet the contract goal.

(a) The following is a list of types of action that the Department will consider as part of the evaluation of the bidder's good faith efforts to obtain participation. These listed factors are not intended to be a mandatory checklist and are not intended to be exhaustive. Other factors or efforts brought to the attention of the Department may be relevant in appropriate cases, and will be considered by the Department.

(1) Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBE companies that have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBE companies to respond to the solicitation. The bidder must determine with certainty if the DBE companies are interested by taking appropriate steps to follow up initial solicitations.

(2) Selecting portions of the work to be performed by DBE companies in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime Contractor might otherwise prefer to perform these work items with its own forces.

(3) Providing interested DBE companies with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

(4) a. Negotiating in good faith with interested DBE companies. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBE companies that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBE companies to perform the work.

b. A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBE companies is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the



ability or desire of a bidder to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Bidders are not, however, required to accept higher quotes from DBE companies if the price difference is excessive or unreasonable.

- (5) Not rejecting DBE companies as being unqualified without sound reasons based on a thorough investigation of their capabilities. The bidder's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non-solicitation of bids in the bidder's efforts to meet the project goal.
  - (6) Making efforts to assist interested DBE companies in obtaining bonding, lines of credit, or insurance as required by the recipient or Contractor.
  - (7) Making efforts to assist interested DBE companies in obtaining necessary equipment, supplies, materials, or related assistance or services.
  - (8) Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBE companies.
- (b) If the Department determines that the bidder has made a good faith effort to secure the work commitment of DBE companies to meet the contract goal, the Department will award the contract provided that it is otherwise eligible for award. If the Department determines that a good faith effort has not been made, the Department will notify the bidder of that preliminary determination by contacting the responsible company official designated in the Utilization Plan. The preliminary determination shall include a statement of reasons why good faith efforts have not been found, and may include additional good faith efforts that the bidder could take. The notification will designate a five working day period during which the bidder shall take additional efforts. The bidder is not limited by a statement of additional efforts, but may take other action beyond any stated additional efforts in order to obtain additional DBE commitments. The bidder shall submit an amended Utilization Plan if additional DBE commitments to meet the contract goal are secured. If additional DBE commitments sufficient to meet the contract goal are not secured, the bidder shall report the final good faith efforts made in the time allotted. All additional efforts taken by the bidder will be considered as part of the bidder's good faith efforts. If the bidder is not able to meet the goal after taking additional efforts, the Department will make a pre-final determination of the good faith efforts of the bidder and will notify the designated responsible company official of the reasons for an adverse determination.
- (c) The bidder may request administrative reconsideration of a pre-final determination adverse to the bidder within the five working days after the notification date of the determination by delivering the request to the Department of Transportation, Bureau of

Small Business Enterprises, Contract Compliance Section, 2300 South Dirksen Parkway, Room 319, Springfield, Illinois 62764 (Telefax: (217)785-1524). Deposit of the request in the United States mail on or before the fifth business day shall not be deemed delivery. The pre-final determination shall become final if a request is not made and delivered. A request may provide additional written documentation and/or argument concerning the issue of whether an adequate good faith effort was made to meet the contract goal. In addition, the request shall be considered a consent by the bidder to extend the time for award. The request will be forwarded to the Department's Reconsideration Officer. The Reconsideration Officer will extend an opportunity to the bidder to meet in person in order to consider all issues of whether the bidder made a good faith effort to meet the goal. After the review by the Reconsideration Officer, the bidder will be sent a written decision within ten working days after receipt of the request for reconsideration, explaining the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so. A final decision by the Reconsideration Officer that a good faith effort was made shall approve the Utilization Plan submitted by the bidder and shall clear the contract for award. A final decision that a good faith effort was not made shall render the bid not responsive.

CONTRACT COMPLIANCE. Compliance with this Special Provision is an essential part of the contract. The Department is prohibited by federal regulations from crediting the participation of a DBE included in the Utilization Plan toward either the contract goal or the Department's overall goal until the amount to be applied toward the goals has been paid to the DBE. The following administrative procedures and remedies govern the compliance by the Contractor with the contractual obligations established by the Utilization Plan. After approval of the Plan and award of the contract, the Utilization Plan and individual DBE Participation Statements become part of the contract. If the Contractor did not succeed in obtaining enough DBE participation to achieve the advertised contract goal, and the Utilization Plan was approved and contract awarded based upon a determination of good faith, the total dollar value of DBE work calculated in the approved Utilization Plan as a percentage of the awarded contract value shall become the amended contract goal.

- (a) No amendment to the Utilization Plan may be made without prior written approval from the Department's Bureau of Small Business Enterprises. All requests for amendment to the Utilization Plan shall be submitted to the Department of Transportation, Bureau of Small Business Enterprises, Contract Compliance Section, 2300 South Dirksen Parkway, Room 319, Springfield, Illinois 62764. Telephone number (217) 785-4611. Telefax number (217) 785-1524.
- (b) All work indicated for performance by an approved DBE shall be performed, managed, and supervised by the DBE executing the Participation Statement. The Contractor shall not terminate for convenience a DBE listed in the Utilization Plan and then perform the work of the terminated DBE with its own forces, those of an affiliate or those of another subcontractor, whether DBE or not, without first obtaining the written consent of the Bureau of Small Business Enterprises to amend the Utilization Plan. If a DBE listed in the Utilization Plan is terminated for reasons other than convenience, or fails to complete its work on the contract for any reason, the Contractor shall make good faith efforts to

find another DBE to substitute for the terminated DBE. The good faith efforts shall be directed at finding another DBE to perform at least the same amount of work under the contract as the DBE that was terminated, but only to the extent needed to meet the contract goal or the amended contract goal. The Contractor shall notify the Bureau of Small Business Enterprises of any termination for reasons other than convenience, and shall obtain approval for inclusion of the substitute DBE in the Utilization Plan. If good faith efforts following a termination of a DBE for cause are not successful, the Contractor shall contact the Bureau and provide a full accounting of the efforts undertaken to obtain substitute DBE participation. The Bureau will evaluate the good faith efforts in light of all circumstances surrounding the performance status of the contract, and determine whether the contract goal should be amended.

- (c) The Contractor shall maintain a record of payments for work performed to the DBE participants. The records shall be made available to the Department for inspection upon request. After the performance of the final item of work or delivery of material by a DBE and final payment therefor to the DBE by the Contractor, but not later than thirty calendar days after payment has been made by the Department to the Contractor for such work or material, the Contractor shall submit a DBE Payment Report on Department form SBE 2115 to the Regional Engineer. If full and final payment has not been made to the DBE, the Report shall indicate whether a disagreement as to the payment required exists between the Contractor and the DBE or if the Contractor believes that the work has not been satisfactorily completed. If the Contractor does not have the full amount of work indicated in the Utilization Plan performed by the DBE companies indicated in the Plan, the Department will deduct from contract payments to the Contractor the amount of the goal not achieved as liquidated and ascertained damages.
- (d) The Department reserves the right to withhold payment to the Contractor to enforce the provisions of this Special Provision. Final payment shall not be made on the contract until such time as the Contractor submits sufficient documentation demonstrating achievement of the goal in accordance with this Special Provision or after liquidated damages have been determined and collected.
- (e) Notwithstanding any other provision of the contract, including but not limited to Article 109.09 of the Standard Specifications, the Contractor may request administrative reconsideration of a decision to deduct the amount of the goal not achieved as liquidated damages. A request to reconsider shall be delivered to the Contract Compliance Section and shall be handled and considered in the same manner as set forth in paragraph (c) of "Good Faith Effort Procedures" of this Special Provision, except a final decision that a good faith effort was not made during contract performance to achieve the goal agreed to in the Utilization Plan shall be the final administrative decision of the Department.

**DOWEL BARS (BDE)**

Effective: April 1, 2007

| Revised: January 1, 2008

| Revise the fifth and sixth sentences of Article 1006.11(b) of the Standard Specifications to read:

| "The bars shall be epoxy coated according to AASHTO M 284, except the thickness of the epoxy shall be 7 to 12 mils (0.18 to 0.30 mm) and patching of the ends will not be required. The epoxy coating applicator shall be certified according to the current Bureau of Materials and Physical Research Policy Memorandum, "Epoxy Coating Plant Certification Procedure". The Department will maintain an approved list."

80178

## EQUIPMENT RENTAL RATES (BDE)

Effective: August 2, 2007

Revised: January 2, 2008

Replace the second and third paragraphs of Article 105.07(b)(4)a. of the Standard Specifications with the following:

"Equipment idled which cannot be used on other work, and which is authorized to standby on the project site by the Engineer, will be paid for according to Article 109.04(b)(4)."

Replace Article 109.04(b)(4) of the Standard Specifications with the following:

"(4) Equipment. Equipment used for extra work shall be authorized by the Engineer. The equipment shall be specifically described, be of suitable size and capacity for the work to be performed, and be in good operating condition. For such equipment, the Contractor will be paid as follows.

- a. Contractor Owned Equipment. Contractor owned equipment will be paid for by the hour using the applicable FHWA hourly rate from the "Equipment Watch Rental Rate Blue Book" (Blue Book) in effect when the force account work begins. The FHWA hourly rate is calculated as follows.

FHWA hourly rate = (monthly rate/176) x (model year adj.) x (Illinois adj.) + EOC

Where: EOC = Estimated Operating Costs per hour (from the Blue Book)

The time allowed will be the actual time the equipment is operating on the extra work. For the time required to move the equipment to and from the site of the extra work and any authorized idle (standby) time, payment will be made at the following hourly rate: 0.5 x (FHWA hourly rate - EOC).

All time allowed shall fall within the working hours authorized for the extra work.

The rates above include the cost of fuel, oil, lubrication, supplies, small tools, necessary attachments, repairs, overhaul and maintenance of any kind, depreciation, storage, overhead, profits, insurance, and all incidentals. The rates do not include labor.

The Contractor shall submit to the Engineer sufficient information for each piece of equipment and its attachments to enable the Engineer to determine the proper equipment category. If a rate is not established in the Blue Book for a particular piece of equipment, the Engineer will establish a rate for that piece of equipment that is consistent with its cost and use in the industry.

b. Rented Equipment. Whenever it is necessary for the Contractor to rent equipment to perform extra work, the rental and transportation costs of the equipment plus five percent for overhead will be paid. In no case shall the rental rates exceed those of established distributors or equipment rental agencies.

All prices shall be agreed to in writing before the equipment is used."

80189

## **EROSION AND SEDIMENT CONTROL DEFICIENCY DEDUCTION (BDE)**

Effective: April 1, 2007

Revise Article 105.03(a) of the Standard Specifications to read:

"(a) Erosion and Sediment Control Deficiency Deduction. When the Engineer is notified or determines an erosion and/or sediment control deficiency(s) exists, he/she will notify and direct the Contractor to correct the deficiency within a specified time. The specified time, which begins upon notification to the Contractor, will be from 1/2 hour to 1 week based on the urgency of the situation and the nature of the deficiency. The Engineer will be the sole judge.

A deficiency may be any lack of repair, maintenance, or implementation of erosion and/or sediment control devices included in the contract, or any failure to comply with the conditions of the National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for Construction Site Activities. A deficiency may also be applied to situations where corrective action is not an option such as the failure to participate in a jobsite inspection of the project, failure to install required measures prior to initiating earth moving operations, disregard of concrete washout requirements, or other disregard of the NPDES permit.

If the Contractor fails to correct a deficiency within the specified time, a daily monetary deduction will be imposed for each calendar day or fraction thereof the deficiency exists. The calendar day(s) will begin with notification to the Contractor and end with the Engineer's acceptance of the correction. The daily monetary deduction will be either \$1000.00 or 0.05 percent of the awarded contract value, whichever is greater. For those deficiencies where corrective action was not an option, the monetary deduction will be immediate and will be valued at one calendar day."

80180

## **PAYMENTS TO SUBCONTRACTORS (BDE)**

Effective: June 1, 2000

Revised: January 1, 2006

Federal regulations found at 49 CFR §26.29 mandate the Department to establish a contract clause to require Contractors to pay subcontractors for satisfactory performance of their subcontracts and to set the time for such payments.

State law also addresses the timing of payments to be made to subcontractors and material suppliers. Section 7 of the Prompt Payment Act, 30 ILCS 540/7, requires that when a Contractor receives any payment from the Department, the Contractor shall make corresponding, proportional payments to each subcontractor and material supplier performing work or supplying material within 15 calendar days after receipt of the Department payment. Section 7 of the Act further provides that interest in the amount of two percent per month, in addition to the payment due, shall be paid to any subcontractor or material supplier by the Contractor if the payment required by the Act is withheld or delayed without reasonable cause. The Act also provides that the time for payment required and the calculation of any interest due applies to transactions between subcontractors and lower-tier subcontractors and material suppliers throughout the contracting chain.

This Special Provision establishes the required federal contract clause, and adopts the 15 calendar day requirement of the State Prompt Payment Act for purposes of compliance with the federal regulation regarding payments to subcontractors. This contract is subject to the following payment obligations.

When progress payments are made to the Contractor according to Article 109.07 of the Standard Specifications, the Contractor shall make a corresponding payment to each subcontractor and material supplier in proportion to the work satisfactorily completed by each subcontractor and for the material supplied to perform any work of the contract. The proportionate amount of partial payment due to each subcontractor and material supplier throughout the contracting chain shall be determined by the quantities measured or otherwise determined as eligible for payment by the Department and included in the progress payment to the Contractor. Subcontractors and material suppliers shall be paid by the Contractor within 15 calendar days after the receipt of payment from the Department. The Contractor shall not hold retainage from the subcontractors. These obligations shall also apply to any payments made by subcontractors and material suppliers to their subcontractors and material suppliers; and to all payments made to lower tier subcontractors and material suppliers throughout the contracting chain. Any payment or portion of a payment subject to this provision may only be withheld from the subcontractor or material supplier to whom it is due for reasonable cause.

This Special Provision does not create any rights in favor of any subcontractor or material supplier against the State or authorize any cause of action against the State on account of any payment, nonpayment, delayed payment, or interest claimed by application of the State Prompt Payment Act. The Department will not approve any delay or postponement of the 15 day requirement except for reasonable cause shown after notice and hearing pursuant to Section



| 7(b) of the State Prompt Payment Act. State law creates other and additional remedies available to any subcontractor or material supplier, regardless of tier, who has not been paid for work properly performed or material furnished. These remedies are a lien against public funds set forth in Section 23(c) of the Mechanics Lien Act, 770 ILCS 60/23(c), and a recovery on the Contractor's payment bond according to the Public Construction Bond Act, 30 ILCS 550.

80022

**PRECAST CONCRETE HANDLING HOLES (BDE)**

Effective: January 1, 2007

Add the following to Article 540.02 of the Standard Specifications:

“(g) Handling Hole Plugs..... 1042.16”

Add the following paragraph after the sixth paragraph of Article 540.06 of the Standard Specifications:

“Handling holes shall be filled with a precast concrete plug and sealed with mastic or mortar, or filled with a polyethylene plug. The plug shall not project beyond the inside surface after installation. When metal lifting inserts are used, their sockets shall be filled with mastic or mortar.”

Add the following to Article 542.02 of the Standard Specifications:

“(ee) Handling Hole Plugs ..... 1042.16”

Revise the fifth paragraph of Article 542.04(d) of the Standard Specifications to read:

“Handling holes in concrete pipe shall be filled with a precast concrete plug and sealed with mastic or mortar; or filled with a polyethylene plug. The plug shall not project beyond the inside surface after installation.”

Add the following to Article 550.02 of the Standard Specifications:

“(o) Handling Hole Plugs..... 1042.16”

Replace the fourth sentence of the fifth paragraph of Article 550.06 of the Standard Specifications with the following:

“Handling holes in concrete pipe shall be filled with a precast concrete plug and sealed with mastic or mortar; or filled with a polyethylene plug. The plug shall not project beyond the inside surface after installation.”

Add the following to Article 602.02 of the Standard Specifications:

“(p) Handling Hole Plugs..... 1042.16(a)”

Replace the fifth sentence of the first paragraph of Article 602.07 of the Standard Specifications with the following:

"Handling holes shall be filled with a precast concrete plug and sealed with mastic or mortar. The plug shall not project beyond the inside surface after installation. When metal lifting inserts are used, their sockets shall be filled with mastic or mortar."

Add the following to Section 1042 of the Standard Specifications:

**"1042.16 Handling Hole Plugs.** Plugs for handling holes in precast concrete products shall be as follows.

- (a) **Precast Concrete Plug.** The precast concrete plug shall have a tapered shape and shall have a minimum compressive strength of 3000 psi (20,700 kPa) at 28 days.
- (b) **Polyethylene Plug.** The polyethylene plug shall have a "mushroom" shape with a flat round top and a stem with three different size ribs. The plug shall fit snugly and cover the handling hole.

The plug shall be according to the following.

Mechanical Properties	Test Method	Value (min.)
Flexural Modulus	ASTM D 790	3300 psi (22,750 kPa)
Tensile Strength (Break)	ASTM D 638	1600 psi (11,030 kPa)
Tensile Strength (Yield)	ASTM D 638	1200 psi (8270 kPa)

Thermal Properties	Test Method	Value (min.)
Brittle Temperature	ASTM D 746	-49 °F (-45 °C)
Vicat Softening Point	ASTM D 1525	194 °F (90 °C)

80171

## RECLAIMED ASPHALT PAVEMENT (RAP) (BDE)

Effective: January 1, 2007

Revised: August 1, 2007

In Article 1030.02(g), delete the last sentence of the first paragraph in (Note 2).

Revise Section 1031 of the Standard Specifications to read:

### "SECTION 1031. RECLAIMED ASPHALT PAVEMENT

**1031.01 Description.** Reclaimed asphalt pavement (RAP) is reclaimed asphalt pavement resulting from cold milling or crushing of an existing dense graded hot-mix asphalt (HMA) pavement. The Contractor shall supply written documentation that the RAP originated from routes or airfields under federal, state, or local agency jurisdiction.

**1031.02 Stockpiles.** The Contractor shall construct individual, sealed RAP stockpiles meeting one of the following definitions. No additional RAP shall be added to the pile after the pile has been sealed. Stockpiles shall be sufficiently separated to prevent intermingling at the base. Stockpiles shall be identified by signs indicating the type as listed below (i.e. "Homogeneous Surface").

Prior to milling, the Contractor shall request the District to provide verification of the quality of the RAP to clarify appropriate stockpile.

- (a) Homogeneous. Homogeneous RAP stockpiles shall consist of RAP from Class I, Superpave (High ESAL), HMA (High ESAL), or equivalent mixtures and represent:  
1) the same aggregate quality, but shall be at least C-quality; 2) the same type of crushed aggregate (either crushed natural aggregate, ACBF slag, or steel slag); 3) similar gradation; and 4) similar asphalt binder content. If approved by the Engineer, combined single pass surface/binder millings may be considered "homogenous" with a quality rating dictated by the lowest coarse aggregate quality present in the mixture.
- (b) Conglomerate 5/8. Conglomerate 5/8 RAP stockpiles shall consist of RAP from Class I, Superpave (High ESAL), HMA (High ESAL), or equivalent mixtures. The coarse aggregate in this RAP shall be crushed aggregate and may represent more than one aggregate type and/or quality but shall be at least C quality. This RAP may have an inconsistent gradation and/or asphalt binder content prior to processing. All conglomerate 5/8 RAP shall be processed prior to testing by crushing to where all RAP shall pass the 5/8 in. (16 mm) or smaller screen. Conglomerate 5/8 RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.
- (c) Conglomerate 3/8. Conglomerate 3/8 RAP stockpiles shall consist of RAP from Class I, Superpave (High ESAL), HMA (High ESAL), or equivalent mixtures. The coarse aggregate in this RAP shall be crushed aggregate and may represent more than one aggregate type and/or quality but shall be at least B quality. This RAP may have an

inconsistent gradation and/or asphalt binder content prior to processing. All conglomerate 3/8 RAP shall be processed prior to testing by crushing to where all RAP shall pass the 3/8 in. (9.5 mm) or smaller screen. Conglomerate 3/8 RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.

(d) Conglomerate "D" Quality (DQ). Conglomerate DQ RAP stockpiles shall consist of RAP from Class I, Superpave (High or Low ESAL), HMA (High or Low ESAL), or equivalent mixtures. The coarse aggregate in this RAP may be crushed or round but shall be at least D quality. This RAP may have an inconsistent gradation and/or asphalt binder content. Conglomerate DQ RAP stockpiles shall not contain steel slag or other expansive material as determined by the Department.

(e) Non-Quality. RAP stockpiles that do not meet the requirements of the stockpile categories listed above shall be classified as "Non-Quality".

RAP containing contaminants, such as earth, brick, sand, concrete, sheet asphalt, bituminous surface treatment (i.e. chip seal), pavement fabric, joint sealants, etc., will be unacceptable unless the contaminants are removed to the satisfaction of the Engineer. Sheet asphalt shall be stockpiled separately.

**1031.03 Testing.** When used in HMA, the RAP shall be sampled and tested either during or after stockpiling.

For testing during stockpiling, washed extraction samples shall be run at the minimum frequency of one sample per 500 tons (450 metric tons) for the first 2000 tons (1800 metric tons) and one sample per 2000 tons (1800 metric tons) thereafter. A minimum of five tests shall be required for stockpiles less than 4000 tons (3600 metric tons).

For testing after stockpiling, the Contractor shall submit a plan for approval to the District proposing a satisfactory method of sampling and testing the RAP pile either in-situ or by restockpiling. The sampling plan shall meet the minimum frequency required above and detail the procedure used to obtain representative samples throughout the pile for testing.

Before extraction, each field sample shall be split to obtain two samples of test sample size. One of the two test samples from the final split shall be labeled and stored for Department use. The Contractor shall extract the other test sample according to Department procedure. The Engineer reserves the right to test any sample (split or Department-taken) to verify Contractor test results.

(a) Testing Conglomerate 3/8. In addition to the requirements above, conglomerate 3/8 RAP shall be tested for maximum theoretical specific gravity ( $G_{mm}$ ) at a frequency of one sample per 500 tons (450 metric tons) for the first 2000 tons (1800 metric tons) and one sample per 2000 tons (1800 metric tons) thereafter. A minimum of five tests shall be required for stockpiles less than 4000 tons (3600 metric tons).

- (b) Evaluation of Test Results. All of the extraction results shall be compiled and averaged for asphalt binder content and gradation and, when applicable  $G_{mm}$ . Individual extraction test results, when compared to the averages, will be accepted if within the tolerances listed below.

Parameter	Homogeneous / Conglomerate	Conglomerate "D" Quality
1 in. (25 mm)		$\pm 5 \%$
1/2 in. (12.5 mm)	$\pm 8 \%$	$\pm 15 \%$
No. 4 (4.75 mm)	$\pm 6 \%$	$\pm 13 \%$
No. 8 (2.36 mm)	$\pm 5 \%$	
No. 16 (1.18 mm)		$\pm 15 \%$
No. 30 (600 $\mu\text{m}$ )	$\pm 5 \%$	
No. 200 (75 $\mu\text{m}$ )	$\pm 2.0 \%$	$\pm 4.0 \%$
Asphalt Binder	$\pm 0.4 \%$ <sup>1/</sup>	$\pm 0.5 \%$
$G_{mm}$	$\pm 0.02$ <sup>2/</sup>	

1/ The tolerance for conglomerate 3/8 shall be  $\pm 0.3 \%$ .

2/ Applies only to conglomerate 3/8. When variation of the  $G_{mm}$  exceeds the  $\pm 0.02$  tolerance, a new conglomerate 3/8 stockpile shall be created which will also require an additional mix design.

If more than 20 percent of the individual sieves are out of the gradation tolerances, or if more than 20 percent of the asphalt binder content test results fall outside the appropriate tolerances, the RAP shall not be used in HMA unless the RAP representing the failing tests is removed from the stockpile. All test data and acceptance ranges shall be sent to the District for evaluation.

With the approval of the Engineer, the ignition oven may be substituted for extractions according to the Illinois Test Procedure, "Calibration of the Ignition Oven for the Purpose of Characterizing Reclaimed Asphalt Pavement (RAP)".

**1031.04 Quality Designation of Aggregate in RAP.** The quality of the RAP shall be set by the lowest quality of coarse aggregate in the RAP stockpile and are designated as follows.

- (a) RAP from Class I, Superpave (High ESAL), or HMA (High ESAL) surface mixtures are designated as containing Class B quality coarse aggregate.
- (b) RAP from Superpave (Low ESAL)/HMA (Low ESAL) IL-19.0L binder and IL-9.5L surface mixtures are designated as Class D quality coarse aggregate.
- (c) RAP from Class I, Superpave (High ESAL), or HMA (High ESAL) binder mixtures, bituminous base course mixtures, and bituminous base course widening mixtures are designated as containing Class C quality coarse aggregate.

- (d) RAP from bituminous stabilized subbase and BAM shoulders are designated as containing Class D quality coarse aggregate.

**1031.05 Use of RAP in HMA.** The use of RAP in HMA shall be as follows.

- (a) Coarse Aggregate Size. The coarse aggregate in all RAP shall be equal to or less than the nominal maximum size requirement for the HMA mixture to be produced.
- (b) Steel Slag Stockpiles. RAP stockpiles containing steel slag or other expansive material, as determined by the Department, shall be homogeneous and will be approved for use in HMA (High ESAL and Low ESAL) surface mixtures only.
- (c) Use in HMA Surface Mixtures (High and Low ESAL). RAP stockpiles for use in HMA surface mixtures (High and Low ESAL) shall be either homogeneous or conglomerate 3/8, in which the coarse aggregate is Class B quality or better.
- (d) Use in HMA Binder Mixtures (High and Low ESAL), HMA Base Course, and HMA Base Course Widening. RAP stockpiles for use in HMA binder mixtures (High and Low ESAL), HMA base course, and HMA base course widening shall be homogeneous, conglomerate 5/8, or conglomerate 3/8, in which the coarse aggregate is Class C quality or better.
- (e) Use in Shoulders and Subbase. RAP stockpiles for use in HMA shoulders and stabilized subbase (HMA) shall be homogeneous, conglomerate 5/8, conglomerate 3/8, or conglomerate DQ.
- (f) The use of RAP shall be a contractor's option when constructing HMA in all contracts. When the contractor chooses the RAP option, the percentage of RAP shall not exceed the amounts indicated in the table for a given N Design.

Max RAP Percentage

HMA MIXTURES <sup>1/, 3/</sup>	MAXIMUM % RAP		
	Binder/Leveling Binder	Surface	Polymer Modified
Ndesign			
30	30	30	10
50	25	15	10
70	15 / 25 <sup>2/</sup>	10 / 15 <sup>2/</sup>	10
90	10	10	10
105	10	10	10

1/ For HMA Shoulder and Stabilized Sub-Base (HMA) N-30, the amount of RAP shall not exceed 50% of the mixture.

2/ Value of Max % RAP if 3/8 RAP is utilized.

- 3/ When RAP exceeds 20%, the high & low virgin asphalt binder grades shall each be reduced by one grade (i.e. 25% RAP would require a virgin asphalt binder grade of PG64-22 to be reduced to a PG58-28).

**1031.06 HMA Mix Designs.** At the Contractor's option, HMA mixtures may be constructed utilizing RAP material meeting the above detailed requirements.

RAP designs shall be submitted for volumetric verification. If additional RAP stockpiles are tested and found that no more than 20 percent of the results, as defined under "Testing" herein, are outside of the control tolerances set for the original RAP stockpile and HMA mix design, and meets all of the requirements herein, the additional RAP stockpiles may be used in the original mix design at the percent previously verified.

**1031.07 HMA Production.** The coarse aggregate in all RAP used shall be equal to or less than the nominal maximum size requirement for the HMA mixture being produced.

To remove or reduce agglomerated material, a scalping screen, crushing unit, or comparable sizing device approved by the Engineer shall be used in the RAP feed system to remove or reduce oversized material. If material passing the sizing device adversely affects the mix production or quality of the mix, the sizing device shall be set at a size specified by the Engineer.

If the RAP control tolerances or QC/QA test results require corrective action, the Contractor shall cease production of the mixture containing RAP and either switch to the virgin aggregate design or submit a new RAP design. When producing mixtures containing conglomerate 3/8 RAP, a positive dust control system shall be utilized.

HMA plants utilizing RAP shall be capable of automatically recording and printing the following information.

(a) Dryer Drum Plants.

- (1) Date, month, year, and time to the nearest minute for each print.
- (2) HMA mix number assigned by the Department.
- (3) Accumulated weight of dry aggregate (combined or individual) in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- (4) Accumulated dry weight of RAP in tons (metric tons) to the nearest 0.1 ton (0.1 metric ton).
- (5) Accumulated mineral filler in revolutions, tons (metric tons), etc. to the nearest 0.1 unit.



- (6) Accumulated asphalt binder in gallons (liters), tons (metric tons), etc. to the nearest 0.1 unit.
  - (7) Residual asphalt binder in the RAP material as a percent of the total mix to the nearest 0.1 percent.
  - (8) Aggregate and RAP moisture compensators in percent as set on the control panel. (Required when accumulated or individual aggregate and RAP are printed in wet condition.)
- (b) Batch Plants.
- (1) Date, month, year, and time to the nearest minute for each print.
  - (2) HMA mix number assigned by the Department.
  - (3) Individual virgin aggregate hot bin batch weights to the nearest pound (kilogram).
  - (4) Mineral filler weight to the nearest pound (kilogram).
  - (5) RAP weight to the nearest pound (kilogram).
  - (6) Virgin asphalt binder weight to the nearest pound (kilogram).
  - (7) Residual asphalt binder in the RAP material as a percent of the total mix to the nearest 0.1 percent.

~~The printouts shall be maintained in a file at the plant for a minimum of one year or as directed by the Engineer and shall be made available upon request. The printing system will be inspected by the Engineer prior to production and verified at the beginning of each construction season thereafter.~~

**1031.08 RAP in Aggregate Surface Course and Aggregate Shoulders.** The use of RAP in aggregate surface course and aggregate shoulders shall be as follows.

- (a) Stockpiles and Testing. RAP stockpiles may be any of those listed in Article 1031.02, except "Other". The testing requirements of Article 1031.03 shall not apply.
- (b) Gradation. One hundred percent of the RAP material shall pass the 1 1/2 in. (37.5 mm) sieve. The RAP material shall be reasonably well graded from coarse to fine. RAP material that is gap-graded or single sized will not be accepted."

80172

**REFLECTIVE SHEETING ON CHANNELIZING DEVICES (BDE)**

Effective: April 1, 2007

Revise the seventh paragraph of Article 1106.02 of the Standard Specifications to read:

“At the time of manufacturing, the retroreflective prismatic sheeting used on channelizing devices shall meet or exceed the initial minimum coefficient of retroreflection as specified in the following table. Measurements shall be conducted according to ASTM E 810, without averaging. Sheeting used on cones, drums and flexible delineators shall be reboundable as tested according to ASTM D 4956. Prestriped sheeting for rigid substrates on barricades shall be white and orange.

Initial Minimum Coefficient of Retroreflection candelas/foot candle/sq ft (candelas/lux/sq m) of material				
Observation Angle (deg.)	Entrance Angle (deg.)	White	Orange	Fluorescent Orange
0.2	-4	365	160	150
0.2	+30	175	80	70
0.5	-4	245	100	95
0.5	+30	100	50	40”

Revise the first sentence of the first paragraph of Article 1106.02(c) of the Standard Specifications to read:

“Barricades and vertical panels shall have alternating white and orange stripes sloping downward at 45 degrees toward the side on which traffic will pass.”

Revise the third sentence of the first paragraph of Article 1106.02(d) of the Standard Specifications to read:

“The bottom panels shall be 8 x 24 in. (200 x 600 mm) with alternating white and orange stripes sloping downward at 45 degrees toward the side on which traffic will pass.”

80183

## REINFORCEMENT BARS (BDE)

Effective: November 1, 2005

Revised: January 2, 2008

Revise Article 1006.10(a) of the Standard Specifications to read:

" (a) Reinforcement Bars. Reinforcement bars will be accepted according to the current Bureau of Materials and Physical Research Policy Memorandum, "Reinforcement Bar and/or Dowel Bar Plant Certification Procedure". The Department will maintain an approved list of producers.

(1) Reinforcement Bars (Non-Coated). Reinforcement bars shall be according to ASTM A 706 (A 706M), Grade 60 (420) for deformed bars and the following.

- a. For straight bars furnished in cut lengths and with a well-defined yield point, the yield point shall be determined as the elastic peak load, identified by a halt or arrest of the load indicator before plastic flow is sustained by the bar and dividing it by the nominal cross-sectional area of the bar.
- b. For bars without a well-defined yield point, including bars straightened from coils, the yield strength shall be determined by taking the corresponding load at 0.005 strain as measured by an extensometer (0.5% elongation under load) and dividing it by the nominal cross-sectional area of the bar.
- c. For bars straightened from coils or bars bent from fabrication, there shall be no upper limit on yield strength; and for bar designation Nos. 3 - 6 (10 - 19), the elongation after rupture shall be at least 9%.
- d. Heat Numbers. Bundles or bars at the construction site shall be marked or tagged with heat identification numbers of the bar producer.
- e. Guided Bend Test. Bars may be subject to a guided bend test across two pins which are free to rotate, where the bending force shall be centrally applied with a fixed or rotating pin of a certain diameter as specified in Table 3 of ASTM A 706 (A 706M). The dimensions and clearances of this guided bend test shall be according to ASTM E 190.
- f. Spiral Reinforcement. Spiral reinforcement shall be deformed or plain bars conforming to the above requirements or cold-drawn steel wire conforming to AASHTO M 32.

(2) Epoxy Coated Reinforcement Bars. Epoxy coated reinforcement bars shall be according to Article 1006.10(a)(1) and shall be epoxy coated according to AASHTO M 284 (M 284M) and the following.

- a. Certification. The epoxy coating applicator shall be certified according to the current Bureau of Materials and Physical Research Policy Memorandum, "Epoxy Coating Plant Certification Procedure". The Department will maintain an approved list.
- b. Coating Thickness. The thickness of the epoxy coating shall be 7 to 12 mils (0.18 to 0.30 mm). When spiral reinforcement is coated after fabrication, the thickness of the epoxy coating shall be 7 to 20 mils (0.18 to 0.50 mm).
- c. Cutting Reinforcement. Reinforcement bars may be sheared or sawn to length after coating, providing the end damage to the coating does not extend more than 0.5 in. (13 mm) back and the cut is patched before any visible rusting appears. Flame cutting will not be permitted."

80151

## RETROREFLECTIVE SHEETING, NONREFLECTIVE SHEETING, AND TRANSLUCENT OVERLAY FILM FOR HIGHWAY SIGNS (BDE)

Effective: April 1, 2007

General. This special provision covers retroreflective sheeting and translucent overlay films intended for application on new or refurbished aluminum. The sheeting serves as the reflectorized background for sign messages and as cutout legends and symbols applied to the reflectorized background. Messages may be applied in opaque black or transparent colors.

This special provision also covers nonreflective sheeting for application on new or refurbished aluminum, and as material for cutout legends and symbols applied to the reflectorized background.

All material furnished under this specification shall have been manufactured within 18 months of the delivery date. All material shall be supplied by the same manufacturer.

Retroreflective Sheeting Properties. Retroreflective sheeting shall consist of a flexible, colored, prismatic, or glass lens elements adhered to a synthetic resin, encapsulated by a flexible, transparent plastic having a smooth outer surface and shall meet the following requirements.

Only suppliers whose products have been tested and approved in the Department's periodic Sheeting Study will be eligible to supply material. All individual batches and or lots of material shall be tested and approved by the Department. The Department reserves the right to sample and test delivered materials according to Federal Specification LS-300.

- (a) Adhesive. The sheeting shall have a Class 1, pre-coated, pressure sensitive adhesive according to ASTM D 4956. The adhesive shall have a protective liner that is easily removed when tested according to ASTM D 4956. The adhesive shall be capable of being applied to new or refurbished aluminum and reflectorized backgrounds without additional adhesive.
- (b) Color. The sheeting shall be uniform in color and devoid of streaks throughout the length of each roll. The color shall conform to the latest appropriate standard color tolerance chart issued by the U.S. Department of Transportation, Federal Highway Administration and to the daytime and nighttime color requirements of ASTM D 4956. Sheeting used for side by side overlay applications shall have a Hunter Lab Delta E of less than 3.
- (c) Coefficient of Retroreflection. When tested according to ASTM E 810, without averaging, the sheeting shall have a minimum coefficient of retroreflection as shown in the following tables. The brightness of the sheeting when totally wet shall be a minimum of 90 percent of the values shown when tested according to the standard rainfall test specified in Section 7.10.1 of AASHTO M 268-84.

Type A Sheeting  
Minimum Coefficient of Retroreflection  
candelas/foot candle/sq ft (candelas/lux/sq m) of material

Type A

Observation Angle (deg.)	Entrance Angle (deg.)	White	Yellow	Orange	Red	Green	Blue	Brown
0.2	-4	250	170	100	45	45	20	12
0.2	+30	150	100	60	25	25	12	8.5
0.5	-4	95	65	30	15	15	8	5
0.5	+30	75	50	25	10	10	5	3.5

Type AA Sheeting  
 Minimum Coefficient of Retroreflection  
 candelas/foot candle/sq ft (candelas/lux/sq m) of material

Type AA (0 and 90 degree rotation)

Observation Angle (deg.)	Entrance Angle (deg.)	White	Yellow	Red	Green	Blue	FO
0.2	-4	800	660	215	80	43	200
0.2	+30	400	340	100	35	20	120
0.5	-4	200	160	45	20	9.8	80
0.5	+30	100	85	26	10	5.0	50

Type AA (45 degree rotation)

Observation Angle (deg.)	Entrance Angle (deg.)	Yellow	FO
0.2	-4	550	165
0.2	+30	130	45
0.5	-4	145	70
0.5	+30	70	40

Type AP Sheeting  
 Minimum Coefficient of Retroreflection  
 candelas/foot candle/sq ft (candelas/lux/sq m) of material

Type AP

Observation Angle (deg.)	Entrance Angle (deg.)	White	Yellow	Red	Green	Blue	Brown	FO
0.2	-4	550	425	100	75	50	30	275
0.2	+30	200	150	40	35	25	15	90
0.5	-4	300	250	60	35	25	20	150
0.5	+30	100	70	20	20	10	5	50

Type AZ Sheeting  
Minimum Coefficient of Retroreflection  
candelas/foot candle/sq ft (candelas/lux/sq m) of material

Type AZ (0 degree rotation)

Observation Angle (deg.)	Entrance Angle (deg.)	White	Yellow	Red	Green	Blue	FYG	FY
0.2	-4	430	350	110	45	20	325	240
0.2	+30	235	140	60	24	11	200	150
0.5	-4	250	200	60	25	10	235	165
0.5	+30	170	135	40	19	7	105	75
1.0	-4	70	45	10	10	4	70	30
1.0	+30	30	20	7	5	2.5	45	15

Type AZ (90 degree rotation)

Observation Angle (deg.)	Entrance Angle (deg.)	White	Yellow	Red	Green	Blue	FYG	FY
0.2	-4	320	250	100	45	20	300	220
0.2	+30	235	140	40	24	11	200	150
0.5	-4	240	200	60	25	10	235	165
0.5	+30	100	85	20	10	7	80	75
1.0	-4	30	30	7	5	4	65	20
1.0	+30	15	15	5	2	2	30	10

- (d) Gloss. The sheeting surface shall exhibit a minimum 85 degree gloss-meter rating of 50 when tested according to ASTM D 523.
- (e) Durability. When processed and applied, the sheeting shall be weather resistant.

Accelerated weathering testing will be performed for 1000 hours (300 hours for orange/FO) according to ASTM G 151. The testing cycle will consist of 8 hours of light at 140 °F (60 °C), followed by 4 hours of condensation at 104 °F (40 °C). Following accelerated weathering, the sheeting shall exhibit a minimum of 80 percent of its initial minimum coefficient of retroreflection as listed in the previous tables.

Outdoor weathering will entail an annual evaluation of material placed in an outdoor rack with a 45 degree angle and a southern sun exposure. The sheeting will be evaluated for five years. Following weathering, the test specimens will be cleaned by immersing them in a five percent hydrochloric acid solution for 45 seconds, then rinsed with water and blotted dry with a soft clean cloth. Following cleaning, the applied sheeting shall show no appreciable discoloration, cracking, streaking, crazing, blistering, or dimensional change. The sheeting shall exhibit a Hunter Lab Delta E of 5 or less when compared to the original.

- (f) Shrinkage. When tested according to ASTM D 4956, the sheeting shall not shrink in any dimension more than 1/32 in. (0.8 mm) in ten minutes and not more than 1/8 in. (3 mm) in 24 hours.
- (g) Workability. The sheeting shall show no cracking, scaling, pitting, blistering, edge lifting, inter-film splitting, curling, or discoloration when processed and applied using mutually acceptable processing and application procedures.
- (h) Splices. A single roll of sheeting shall contain a maximum of four splices per 50 yd (45 m) length. The sheeting shall be overlapped a minimum of 3/16 in. (5 mm) at each splice.
- (i) Adhesive Bond. The sheeting shall form a durable bond to smooth, corrosion and weather-resistant surfaces and adhere securely when tested according to ASTM D 4956.
- (j) Positionability. Sheeting, with ASTM D 4956 Class 3 adhesive, used for manufacturing cutout legends and borders shall provide sufficient positionability during the fabrication process to permit removal and reapplication without damage to either the legend or sign background and shall have a plastic liner suitable for use on bed cutting machines. Thereafter, all other adhesive and bond requirements contained in the specification shall apply.

Positionability shall be verified by cutting 4 in. (100 mm) letters E, I, K, M, S, W, and Y out of the positionable material. The letters shall then be applied to a sheeted aluminum blank using a single pass of a two pound roller. The letters shall sit for five minutes and then a putty knife shall be used to lift a corner. The thumb and fore finger shall be used to slowly pull the lifted corner to lift letters away from the sheeted aluminum. The letters shall not tear or distort when removed.

- (k) Thickness. The thickness of the sheeting without the protective liner shall be less than or equal to 0.015 in. (0.4 mm), or 0.025 in. (0.6 mm) for prismatic material.
- (l) Processing. The sheeting shall permit cutting and color processing according to the sheeting manufacturer's specifications at temperatures of 60 to 100 °F (15 to 38 °C) and within a relative humidity range of 20 to 80 percent. The sheeting shall be heat resistant and permit forced curing without staining the applied or unapplied sheeting at temperatures recommended by the manufacturer. The sheeting shall be solvent resistant and capable of being cleaned with VM&P naphtha, mineral spirits, and turpentine.

Transparent color and opaque black inks shall be single component and low odor. The inks shall dry within eight hours and not require clear coating. After color processing on white sheeting, the sheeting shall show no appreciable discoloration, cracking, streaking, crazing, blistering, or dimensional change when tested for durability (e). The ink on the weathered, prepared panel shall exhibit a Hunter Lab Delta E of 5 or less when compared to the original.



Transparent color electronic cutting films shall be acrylic. After application to white sheeting, the films shall show no appreciable discoloration, cracking, streaking, crazing, blistering, or dimensional change when tested for durability (e). The films on the weathered, prepared panel shall exhibit a Hunter Lab Delta E of 5 or less when compared to the original.

Transparent colors screened, or transparent acrylic electronic cutting films, on white sheeting, shall have a minimum initial coefficient of retroreflection values of 50 percent for yellow and red, and a minimum 70 percent for green, blue, and brown of the 0.2 degree observation angle/-4.0 degree entrance angle values as listed in the previous tables for the color being applied. After durability testing, the colors shall retain a minimum 80 percent of the initial coefficient of retroreflection.

- (m) Identification: The sheeting shall have a distinctive overall pattern in the sheeting unique to the manufacturer. If material orientation is required for optimum retroreflectivity, permanent orientation marks shall be incorporated into the face of the sheeting. Neither the overall pattern nor the orientation marks shall interfere with the reflectivity of the sheeting.
- (n) Packaging. Both ends of each box shall be clearly labeled with the sheeting type, color, adhesive type, manufacturer's lot number, date of manufacture, and supplier's name. Material Safety Data Sheets and technical bulletins for all materials shall be furnished to the Department with each shipment.

Nonreflective Sheeting Properties. Nonreflective sheeting shall consist of a flexible, pigmented cast vinyl film having a smooth, flat outer surface and shall meet the following requirements.

The Department reserves the right to sample and test delivered materials according to Federal Specification LS-300.

- (a) Adhesive. The sheeting shall have a Class 1, pre-coated, pressure sensitive adhesive according to ASTM D 4956. The adhesive shall have a protective liner that is easily removed when tested according to ASTM D 4956. The adhesive shall be capable of being applied to new or refurbished aluminum and reflectorized backgrounds without additional adhesive.
- (b) Color. The sheeting shall be uniform in color and devoid of streaks throughout the length of each roll.
- (c) Gloss. The sheeting shall exhibit a minimum 85 degree gloss-meter rating of 40 when tested according to ASTM D 523.
- (d) Durability. Applied sheeting that has been vertically exposed to the elements for seven years shall show no appreciable discoloration, cracking, crazing, blistering, delamination, or loss of adhesion. A slight amount of chalking is permitted but the sheeting shall not support fungus growth.

(e) Testing. Test panels shall be prepared by applying the sheeting to 6 1/2 x 6 1/2 in. (165 x 165 mm) pieces of aluminum according to the manufacturer's specifications. The edges of the panel shall be trimmed evenly and aged 48 hours at 70 to 90 °F (21 to 32 °C). Shrinkage and immersion testing shall be as follows.

- (1) Shrinkage. The sheeting shall not shrink more than 1/64 in. (0.4 mm) from any panel edge when subjected to a temperature of 150 °F (66 °C) for 48 hours and shall be sufficiently heat resistant to retain adhesion after one week at 150 °F (66 °C).
- (2) Immersion Testing. The sheeting shall show no appreciable decrease in adhesion, color, or general appearance when examined one hour after being immersed to a depth of 2 or 3 in. (50 or 75 mm) in the following solutions at 70 to 90 °F (21 to 32 °C) for specified times.

Solution	Immersion Time (hours)
Reference Fuel (M I L-F-8799A) (15 parts xylol and 85 parts mineral spirits by weight)	1
Distilled Water	24
SAE No. 20 Motor Oil	24
Antifreeze (1/2 ethylene glycol, 1/2 distilled water)	24

(f) Adhesive Bond: The sheeting shall form a durable bond to smooth, corrosion and weather-resistant surfaces and adhere securely when tested according to ASTM D 4956.

(g) Thickness. The thickness of the sheeting without the protective liner shall be a maximum of 0.005 in. (0.13 mm).

(h) Cutting. Material used on bed cutting machines shall have a smooth plastic liner.

(i) Identification. The sheeting shall have a distinctive overall pattern in the sheeting unique to the manufacturer. If material orientation is required for optimum retroreflectivity, permanent orientation marks shall be incorporated into the face of the sheeting. Neither the overall pattern nor the orientation marks shall interfere with the reflectivity of the sheeting.

(j) Packaging. Both ends of each box shall be clearly labeled with the sheeting type, color, adhesive type, manufacturer's lot number, date of manufacture, and supplier's name. Material Safety Data Sheets and technical bulletins for all materials shall be furnished to the Department with each shipment.

**SEEDING (BDE)**

Effective: July 1, 2004

Revised: August 1, 2007

Revise the following seeding mixtures shown in Table 1 of Article 250.07 of the Standard Specifications to read:

"Table 1 - SEEDING MIXTURES		
Class - Type	Seeds	lb/acre (kg/hectare)
2 Roadside Mixture 7/	Tall Fescue (Inferno, Tarheel II, Quest, Blade Runner, or Falcon IV)	100 (110)
	Perennial Ryegrass	50 (55)
	Creeping Red Fescue	40 (50)
	Red Top	10 (10)
2A Salt Tolerant Roadside Mixture 7/	Tall Fescue (Inferno, Tarheel II, Quest, Blade Runner, or Falcon IV)	60 (70)
	Perennial Ryegrass	20 (20)
	Red Fescue (Audubon, Sea Link, or Epic)	30 (20)
	Hard Fescue (Rescue 911, Spartan II, or Reliant IV)	30 (20)
	Fulfs Salt Grass 1/	60 (70)"

Revise Table II of Article 1081.04(c)(6) of the Standard Specifications to read:

TABLE II						
Variety of Seeds	Hard Seed	Purity	Pure Live	Weed	Secondary *	Notes
	%	%	Seed %	%	No. per oz (kg)	
	Max.	Min.	Min.	Max.	Max. Permitted	
Alfalfa	20	92	89	0.50	6 (211)	1/
Clover, Alsike	15	92	87	0.30	6 (211)	2/
Red Fescue, Audubon	0	97	82	0.10	3 (105)	-
Red Fescue, Creeping	-	97	82	1.00	6 (211)	-
Red Fescue, Epic	-	98	83	0.05	1 (35)	-
Red Fescue, Sea Link	-	98	83	0.10	3 (105)	-
Tall Fescue, Blade Runner	-	98	83	0.10	2 (70)	-
Tall Fescue, Falcon IV	-	98	83	0.05	1 (35)	-
Tall Fescue, Inferno	0	98	83	0.10	2 (70)	-
Tall Fescue, Tarheel II	-	97	82	1.00	6 (211)	-
Tall Fescue, Quest	0	98	83	0.10	2 (70)	-
Fulfs Salt Grass	0	98	85	0.10	2 (70)	-
Kentucky Bluegrass	-	97	80	0.30	7 (247)	4/
Oats	-	92	88	0.50	2 (70)	3/
Redtop	-	90	78	1.80	5 (175)	3/

TABLE II						
Variety of Seeds	Hard Seed %	Purity %	Pure Live Seed %	Weed %	Secondary * Noxious Weeds No. per oz (kg)	Notes
	Max.	Min.	Min.	Max.	Max. Permitted	
Ryegrass, Perennial, Annual	-	97	85	0.30	5 (175)	3/
Rye, Grain, Winter	-	92	83	0.50	2 ( 70)	3/
Hard Fescue, Reliant IV	-	98	83	0.05	1 (35)	-
Hard Fescue, Rescue 911	0	97	82	0.10	3 (105)	-
Hard Fescue, Spartan II	-	98	83	0.10	3 (105)	-
Timothy	-	92	84	0.50	5 (175)	3/
Wheat, hard Red Winter	-	92	89	0.50	2 ( 70)	3/

Revise the first sentence of the first paragraph of Article 1081.04(c)(7) of the Standard Specifications to read:

"The seed quantities indicated per acre (hectare) for Prairie Grass Seed in Classes 3, 3A, 4, 4A, 6, and 6A in Article 250.07 shall be the amounts of pure, live seed per acre (hectare) for each species listed."

80131

## SELF-CONSOLIDATING CONCRETE FOR PRECAST PRODUCTS (BDE)

Effective: July 1, 2004

Revised: January 1, 2007

Definition. Self-consolidating concrete is a flowable mixture that does not require mechanical vibration for consolidation.

Usage. Self-consolidating concrete may be used for precast concrete products.

Materials. Materials shall be according to Section 1021 of the Standard Specifications.

Mix Design Criteria. The mix design criteria shall be as follows:

- (a) The minimum cement factor shall be according to Article 1020.04 of the Standard Specifications. If the maximum cement factor is not specified, it shall not exceed 7.05 cwt/cu yd (418 kg/cu m).
- (b) The maximum allowable water/cement ratio shall be according to Article 1020.04 of the Standard Specifications or 0.44, whichever is lower.
- (c) The slump requirements of Article 1020.04 of the Standard Specifications shall not apply.
- (d) The coarse aggregate gradations shall be CA 13, CA 14, CA 16, or a blend of these gradations. CA 11 may be used when the Contractor provides satisfactory evidence to the Engineer that the mix will not segregate. The fine aggregate proportion shall be a maximum 50 percent by weight (mass) of the total aggregate used.
- (e) The slump flow range shall be  $\pm 2$  in. ( $\pm 50$  mm) of the Contractor target value, and within the overall Department range of 20 in. (510 mm) minimum to 28 in. (710 mm) maximum.
- (f) The visual stability index shall be a maximum of 1.
- (g) The J-ring value shall be a maximum of 4 in. (100 mm). The Contractor may specify a lower maximum in the mix design.
- (h) The L-box blocking ratio shall be a minimum of 60 percent. The Contractor may specify a higher minimum in the mix design.
- (i) The column segregation index shall be a maximum 15 percent.
- (j) The hardened visual stability index shall be a maximum of 1.

Placing and Consolidating. The maximum distance of horizontal flow from the point of deposit shall be 25 ft (7.6 m), unless approved otherwise by the Engineer.

Concrete shall be rodded with a piece of lumber, conduit, or vibrator if the material has lost its fluidity prior to placement of additional concrete. The vibrator shall be the pencil head type with a maximum diameter or width of 1 in. (25 mm). Any other method for restoring the fluidity of the concrete shall be approved by the Engineer.

Mix Design Approval. The Contractor shall obtain mix design approval according to the Department's Policy Memorandum "Quality Control/Quality Assurance Program for Precast Concrete Products".

80132

**SILT FILTER FENCE (BDE)**

Effective: January 1, 2008

For silt filter fence fabric only, revise Article 1080.02 of the Standard Specifications to read:

**“1080.02 Geotextile Fabric.** The fabric for silt filter fence shall be a woven fabric meeting the requirements of AASHTO M 288 for unsupported silt fence with less than 50 percent geotextile elongation.”

Replace the last sentence of Article 1081.15(b) of the Standard Specifications with the following:

“Silt filter fence stakes shall be a minimum of 4 ft (1.2 m) long and made of either wood or metal. Wood stakes shall be 2 in. x 2 in. (50 mm x 50 mm). Metal stakes shall be a standard T or U shape having a minimum weight (mass) of 1.32 lb/ft (600 g/300 mm).”

80197

**STONE GRADATION TESTING (BDE)**

Effective: November 1, 2007

Revise the first sentence of note 1/ of the Erosion Protection and Sediment Control Gradations table of Article 1005.01(c)(1) of the Standard Specifications to read:

“A maximum of 15 percent of the total test sample by weight may be oversize material.”

80191



## **SUBCONTRACTOR MOBILIZATION PAYMENTS (BDE)**

Effective: April 2, 2005

To account for the preparatory work and operations necessary for the movement of subcontractor personnel, equipment, supplies, and incidentals to the project site and for all other work or operations that must be performed or costs incurred when beginning work approved for subcontracting in accordance with Article 108.01 of the Standard Specifications, the Contractor shall make a mobilization payment to each subcontractor.

This mobilization payment shall be made at least 14 days prior to the subcontractor starting work. The amount paid shall be equal to 3 percent of the amount of the subcontract reported on form BC 260A submitted for the approval of the subcontractor's work.

This provision shall be incorporated directly or by reference into each subcontract approved by the Department.

80143

## TEMPORARY EROSION CONTROL (BDE)

Effective: November 1, 2002

Revised: January 1, 2008

Revise the third paragraph of Article 280.03 of the Standard Specifications to read:

“Erosion control systems shall be installed prior to beginning any activities which will potentially create erodible conditions. Erosion control systems for areas outside the limits of construction such as storage sites, plant sites, waste sites, haul roads, and Contractor furnished borrow sites shall be installed prior to beginning soil disturbing activities at each area. These offsite systems shall be designed by the Contractor and be subject to the approval of the Engineer.”

Add the following paragraph after the third paragraph of Article 280.03 of the Standard Specifications:

“The temporary erosion and sediment control systems shown on the plans represent the minimum systems anticipated for the project. Conditions created by the Contractor’s operations, or for the Contractor’s convenience, which are not covered by the plans, shall be protected as directed by the Engineer at no additional cost to the Department. Revisions or modifications of the erosion and sediment control systems shall have the Engineer’s written approval.”

Add the following paragraph after the ninth paragraph of Article 280.07 of the Standard Specifications:

“Temporary or permanent erosion control systems required for areas outside the limits of construction will not be measured for payment.”

Delete the tenth (last) paragraph of Article 280.08 of the Standard Specifications.

80087

## THERMOPLASTIC PAVEMENT MARKINGS (BDE)

Effective: January 1, 2007

Revise Article 1095.01(a)(2) of the Standard Specifications to read:

"(2) Pigment. The pigment used for the white thermoplastic compound shall be a high-grade pure (minimum 93 percent) titanium dioxide ( $TiO_2$ ). The white pigment content shall be a minimum of ten percent by weight and shall be uniformly distributed throughout the thermoplastic compound.

The pigments used for the yellow thermoplastic compound shall not contain any hazardous materials listed in the Environmental Protection Agency Code of Federal Regulations (CFR) 40, Section 261.24, Table 1. The combined total of RCRA listed heavy metals shall not exceed 100 ppm when tested by X-ray fluorescence spectroscopy. The pigments shall also be heat resistant, UV stable and color-fast yellows, golds, and oranges, which shall produce a compound which shall match Federal Standard 595 Color No. 33538. The pigment shall be uniformly distributed throughout the thermoplastic compound."

Revise Article 1095.01(b)(1)e. of the Standard Specifications to read:

"e. Daylight Reflectance and Color. The thermoplastic compound after heating for four hours  $\pm$  five minutes at  $425 \pm 3$  °F ( $218.3 \pm 2$  °C) and cooled at 77 °F (25 °C) shall meet the following requirements for daylight reflectance and color, when tested, using a color spectrophotometer with 45 degree circumferential/zero degree geometry, illuminant C, and two degree observer angle. The color instrument shall measure the visible spectrum from 380 to 720 nm with a wavelength measurement interval and spectral bandpass of 10 nm.

White: Daylight Reflectance .....75 percent min.

\*Yellow: Daylight Reflectance .....45 percent min.

\*Shall meet the coordinates of the following color tolerance chart.

x	0.490	0.475	0.485	0.530
y	0.470	0.438	0.425	0.456"

Revise Article 1095.01(b)(1)k. of the Standard Specifications to read:

"k. Accelerated Weathering. After heating the thermoplastic for four hours  $\pm$  five minutes at  $425 \pm 3$  °F ( $218.3 \pm 2$  °C) the thermoplastic shall be applied to a steel wool abraded aluminum alloy panel (Federal Test Std. No. 141, Method 2013) at a film thickness of 30 mils (0.70 mm) and allowed to cool for 24 hours at room temperature. The coated panel shall be subjected to accelerated weathering

using the light and water exposure apparatus (fluorescent UV - condensation type) for 75 hours according to ASTM G 53 (equipped with UVB-313 lamps).

The cycle shall consist of four hours UV exposure at 122 °F (50 °C) followed by four hours of condensation at 104 °F (40 °C). UVB 313 bulbs shall be used. At the end of the exposure period, the panel shall not exceed 10 Hunter Lab Delta E units from the original material."

80176

**WORKING DAYS (BDE)**

Effective: January 1, 2002

The Contractor shall complete the work within 215 working days.

80071

# PROJECT MANUAL

## State of Illinois Department of Transportation Division of Highways

### LEWIS & CLARK TOWERS PHASE 2

**Contract: 97331**

**Section: 03-00026-00-PK/06-00026-01 MS**

**Project: NO. SBIL-TE-00D8(113)**

**Village of Hartford**

**Jurisdiction of  
Wood River Drainage & Levee District**

543 W. Madison Avenue  
Wood River, IL 62095  
618-254-7457  
618-779-9176 FAX

**Civil Engineer / Land Survey:  
Blotevogel Assoc. Inc.**

2 Ginger Creek Parkway  
Glen Carbon, IL 62034  
618-656-4166  
618-656-7127 Fax

**Structural Engineer:  
S.S.E. Inc.**

138 W. Clinton Place  
St. Louis, MO 63122  
314-965-2233  
314-965-8269 Fax

**Architect, Mechanical Design, Electrical  
Design & Plumbing:**

**KAI**  
211 N. Broadway, Suite 1900  
St. Louis, Missouri 63102  
314-241-8188  
314-241-0125 Fax

**Geotechnical Engineer:  
SCI Engineering Inc.**

15 Executive Drive, Suite 4  
Fairview Heights, IL 62208  
618-624-6969  
314-231-6733 / 618-624-7099 Fax

**Construction Manager:**

**KAI**  
211 N. Broadway, Suite 1900  
St. Louis, Missouri 63102  
314-241-8188  
314-241-0125 Fax

KAI 10-02048

Bidding Documents – Not For Construction - December 20, 2007

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NOT APPLICABLE

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NOT APPLICABLE



Division	Section Title	Pages
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NOT APPLICABLE

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NOT APPLICABLE

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**SECTION 01010 - SUMMARY OF WORK****1.1 RELATED DOCUMENTS**

- A. Drawings and General Provisions of Contract, including General, Supplementary and Special Conditions and other Division 1 Specification Sections apply to this Section.

**1.2 PROJECT DESCRIPTION**

- A. Project Identification: Lewis and Clark Memorial Tower, KAI #10-02048.
  - 1. Project Location: 435 Memorial Tower Drive, Madison County, Hartford, Illinois.
- B. Owner: Village of Hartford.
  - 1. Owner's Representative: Deanna Barnes, 140 West Hawthorne, Hartford, IL 62048.
- C. Architect: Kennedy Associates Incorporated, 211 North Broadway, Suite 1900, St. Louis, MO 63102.
- D. Construction Manager: Kennedy Associates Incorporated, 211 North Broadway, Suite 1900, St. Louis, MO 63102

**1.3 DRAWINGS INCLUDED IN CONTRACT DOCUMENTS**

- A. Refer to Section 00900 Drawing Index for Contract Drawing List.

**1.4 CONTRACT**

- A. The Work will be constructed under Multiple Prime Contracts.

**1.5 OWNER FURNISHED PRODUCTS**

- A. Products indicated N.I.C. (Not in Contract) or E.O. (Equipment by Owner) will be furnished and installed by the Owner.
- B. The Owner will arrange and pay for delivery of Owner-furnished items in accordance with the Contractor's Construction Schedule, and will inspect deliveries for damage.

- C. If Owner-furnished items are damaged, defective or missing, the Owner will arrange for replacement. The Owner will also arrange for manufacturer's field services, and the delivery of manufacturer's warranties and bonds to the Contractor.
- D. The Contractor is responsible for designating the delivery dates of Owner-furnished items in the Contractor's Construction Schedule and for receiving, unloading and handling Owner-furnished items at the site. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements, and to repair or replace items damaged as a result of his operations.

#### **1.6 CONTRACTOR'S USE OF PREMISES**

- A. Conform operations at the site to areas and methods permitted by:
  - 1. Laws.
  - 2. Ordinances.
  - 3. Permits.
  - 4. Contract Documents.
  - 5. Owner's regulations.
- B. Do not unreasonably encumber site with materials or equipment.
- C. Each Contractor is responsible for protection and safekeeping of his materials, products and equipment stored on the premises or incorporated into the construction until his contract is complete and accepted by the Owner.
- D. Move at the Contractor's/Subcontractor's cost any stored materials, products or equipment which interfere with operations of Owner or others.

**END OF SECTION 01010**

**SECTION 01027 - APPLICATIONS FOR PAYMENT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
- B. This Section specifies administrative and procedural requirements governing each prime contractor's Application for Payments
- C. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, Submittal Schedule, and List of Subcontracts.

**1.3 SCHEDULE OF VALUES**

- A. Coordinate preparation of the Schedule of values with preparation of the Contractor's Construction Schedule.
- B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
  - 1. Contractor's Construction Schedule.
  - 2. Application for Payment form.
  - 3. List of Subcontractors.
  - 4. Schedule of Allowances.
  - 5. Schedule of Alternates.
  - 6. List of Principal Suppliers and Fabricators.
  - 7. Schedule of Submittals.
- C. Submit the Schedule of Values to the Construction Manager within two (2) weeks after award of contract.

- D. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values. Provide at least one line item for each applicable Specification Section.
- E. Identification: Include the following Project identification on the Schedule of Values:
1. Project name and location.
  2. Name of the Owner, and Construction Manager.
  3. Contract number.
  4. Contractor's name and address.
  5. Date of submittal.
- F. F. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
1. Generic name.
  2. Related Specification Section.
  3. Name of subcontractor.
  4. Name of manufacturer or fabricator.
  5. Name of supplier.
  6. Change Orders (numbers) that have affected value.
  7. Dollar value.
  8. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.
- G. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items.
- H. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
- I. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- J. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

- K. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in- place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.
- L. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Construction Manager and paid for by the Owner.
- B. The initial Application for Payment and the final Application for Payment involve additional requirements.
- C. Payment Application Times: Each progress payment request shall be submitted on the 25th of the month or if a weekend or holiday, on the last normal workday prior to the 25th of the month. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- D. Payment Application Forms: Forms are included with the specifications.
- E. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. The Construction Manager will return incomplete applications without action.
- F. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
- G. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
- H. Transmittal: Submit 3 executed copies of each Application for Payment to the Construction Manager by a method ensuring receipt within 24 hours; each copy shall be complete, including waivers of lien and similar attachments.
- I. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Construction Manager.
- J. Certification and waiver of lien shall be completed and submitted each month as a part of the Contractor's application for payment.

- K. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
1. List of subcontractors.
  2. List of principal suppliers and fabricators.
  3. Schedule of Values.
  4. Contractor's Construction Schedule (preliminary if not final).
  5. Schedule of principal products.
  6. Submittal Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits
  10. Copies of authorizations and licenses from governing authorities for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction meeting.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds (if required).
  15. Data needed to acquire Owner's insurance.
  16. Initial settlement survey and damage report, if required.
- L. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- M. Administrative actions and submittals that shall precede or coincide with this application include:
1. Occupancy permits and similar approvals.
  2. Warranties (guarantees) and maintenance agreements.
  3. Maintenance instructions.
  4. Changeover information related to Owner's occupancy, use, operation, and maintenance.
  5. Final cleaning.
  6. Application for reduction of retainage and consent of surety.
  7. Advice on shifting insurance coverage's.
  8. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
- N. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
1. Completion of Project closeout requirements.

2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
4. Assurance that Work not complete and accepted will be completed without undue delay.
5. Transmittal of required Project construction records to Owner.
6. Proof that taxes, fees and similar obligations have been paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.



PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01027

**SECTION 01035 - MODIFICATION PROCEDURE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
  - 1. Multiple Prime Contracts: Provisions of this Section apply to the Work of each prime Contractor.
- B. Related Sections: The following sections contain requirements that relate to this Section:
  - 1. Section 01026, Unit Prices for administrative requirements governing use of unit prices.
  - 2. Section 01300, Submittals for requirements for the Contractor's Construction Schedule.
  - 3. Section 01027, Applications for Payment for administrative procedures governing applications for payment.
  - 4. Section 01600, Product Substitutions for administrative procedures for handling requests for substitutions made after award of the Contract.

**1.3 MINOR CHANGES IN THE WORK**

- A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Construction Manager.

**1.4 CHANGE ORDER PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Proposed changes in the Work that will require adjustment to the Contract Sum or Contract Time will be issued by the Construction Manager, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.

1. Proposal requests issued by the Construction Manager are for information only. Do not consider them as instruction either to stop work in progress, or to execute the proposed change.
  2. Unless otherwise indicated in the proposal request, within 10 days of receipt of the proposal request, submit to the Construction Manager for the Owner's review an estimate of cost necessary to execute the proposed change.
    - a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Construction Manager.
1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.
  2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges and equipment rental.
  4. Comply with requirements in Section 01600 if the proposed change in the Work requires the substitution of one product or system for a product or system specified.

## 1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Construction Manager may issue a Field Order, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. The Field Order will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.

**1.6 CHANGE ORDER PROCEDURES**

- A. Upon the Owner's approval of a Change Order Proposal Request, the Construction Manager will issue a Change Order for signatures of the Owner and Contractor as provided in the Conditions and General Conditions of the Contract.

**PART 2 - PRODUCTS  
(NOT APPLICABLE)**

**PART 3 - EXECUTION  
(NOT APPLICABLE)**

**END OF SECTION 01035**

**SECTION 01041 - PROJECT COORDINATION - MULTIPLE PRIME CONTRACTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies minimum administrative and supervisory requirements necessary for coordination on the Project to be collectively fulfilled by the prime Contractors including, but not limited to:
  - 1. Coordination.
  - 2. Administrative and supervisory personnel.
  - 3. General installation provisions.
  - 4. Cleaning and protection.
- B. Where applicable, each prime Contractor shall participate in these coordination requirements, even though certain areas of responsibility are assigned to a specific prime Contractor, and even though the Contractor for General Construction may be assigned general responsibility for overall coordination purposes.
- C. Progress meetings, coordination meetings and pre-installation conferences are included in Section 01200 "Project Meetings".
- D. Requirement for the Contractor's Construction Schedule is included in Section 01300.

**1.3 COORDINATION**

- A. Coordination: Each prime Contractor shall coordinate its construction activities with those of other prime Contractors and other entities involved to assure efficient and orderly installation of each part of the Work. Each prime Contractor shall coordinate its operations with operations included under different Sections of the Specifications that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, each prime Contractor shall schedule its construction activities in the sequence required to obtain the best results for the project as determined by the Owner.
  2. Where availability of space is limited, each prime Contractor shall coordinate installation of different components with other prime Contractors to assure maximum accessibility for required maintenance, service, and repair.
  3. Each prime Contractor shall make adequate provisions to accommodate items scheduled for later installation.
- B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include items such as required notices, reports, and attendance at meetings.
1. Prepare similar memoranda for the Construction Manager and separate Contractors where coordination of their Work is required.
- C. Administrative Procedures: Each prime Contractor shall coordinate scheduling and timing of its administrative procedures with other construction activities and activities of other prime Contractors to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to:
1. Preparation of schedules.
  2. Installation and removal of temporary facilities.
  3. Delivery and processing of submittals.
  4. Progress meetings.
  5. Project Closeout activities.

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Contract Documents and Specification Section 01300.
- B. Coordination Drawings: Prepare and submit Coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.
1. Show the interrelationship of components shown on separate Shop Drawings.
  2. Indicate required installation sequences.
  3. Comply with requirements contained in Section 01300 "Submittals".

4. Refer to Division-15 Section and Division-16 Section for specific Coordination Drawing requirements for mechanical and electrical installations.
  5. Preparation Responsibility: Preparation of Coordination Drawings is the responsibility of the prime Contractor principally involved, where involvement by other prime Contractors is minor.
    - a. Where there is substantial participation by more than one prime Contractor, the Construction Manager shall designate the prime Contractor with the most involvement as responsible for preparation of Coordination Drawings.
  6. Costs for rework, re-fabrication, schedule impact, etc. which are associated with conflicts resulting from the absence of coordination drawings will be borne by the Contractor responsible for preparation of said drawings.
- C. Staff Names: Within 10 days of Notice to of Intent to Award, each prime Contractor shall submit a list of its principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.
1. Post copies of the list in the temporary field office, and at each temporary telephone.

#### **1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL**

- A. General: In addition to its Project superintendent, each prime Contractor shall provide other administrative and supervisory personnel, required for proper performance of the Work, including special personnel required for coordination of operations with the other prime Contractors.

### **PART 2 - PRODUCTS**

**(NOT APPLICABLE)**

### **PART 3 - EXECUTION**

#### **3.1 GENERAL INSTALLATION PROVISIONS**

- A. Inspection of Conditions: The prime Contractor involved shall require the installer of each major component to inspect both the substrate and conditions

under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

- B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.
  - 1. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.
  - 2. Provide attachment and connection devices and methods necessary for securing Work. Secure Work true to line and level. Allow for expansion and building movement.
- C. Visual Effects: Provide uniform joint widths in exposed Work. Arrange joints in exposed Work to obtain the best visual effect. Refer questionable choices to the Construction Manager for final decision.
- D. Recheck measurements and dimensions, before starting each installation.
- E. Install each component during weather conditions and project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- F. Enclosure of the Work: Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.
- G. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Prior to installation, contractor shall coordinate with the work of other trades to assure no conflicts exist. Refer questionable mounting height decisions to the Construction Manager for final decision.

### **3.2 CLEANING AND PROTECTION**

- A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure freedom from damage or deterioration at Substantial Completion.
- B. Clean and maintain completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.



- C. Limiting Exposures: Each prime Contractor shall supervise its construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to the following:
1. Excessive static or dynamic loading.
  2. Excessive internal or external pressures.
  3. Excessively high or low temperatures.
  4. Thermal shock.
  5. Excessively high or low humidity.
  6. Air contamination or pollution.
  7. Water or ice.
  8. Solvents.
  9. Chemicals.
  10. Light.
  11. Radiation.
  12. Puncture.
  13. Abrasion.
  14. Heavy traffic.
  15. Soiling, staining and corrosion.
  16. Bacteria.
  17. Rodent and insect infestation.
  18. Combustion.
  19. Electrical current.
  20. High speed operation,
  21. Improper lubrication,
  22. Unusual wear or other misuse.
  23. Contact between incompatible materials.
  24. Destructive testing.
  25. Misalignment.
  26. Excessive weathering.
  27. Unprotected storage.
  28. Improper shipping or handling.
  29. Theft.
  30. Vandalism.

**END OF SECTION 01041**

**SECTION 01125 - SUMMARY OF MULTIPLE CONTRACTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Sections include the following:
  - 1. Division 1 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of the premises, and Owner-occupancy requirements.
  - 2. Division 1 Section "Project Management and Coordination" for general coordination requirements.
  - 3. Division 1 Section "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.

**1.3 COORDINATION**

- A. Project Coordinator shall be responsible for coordination between the Contracts.
  - 1. Construction Manager shall act as Project Coordinator.

**1.4 PROJECT COORDINATOR**

- 1. Coordination activities of Project Coordinator include, but are not limited to, the following:
  - a. Provide overall coordination of the Work.
  - b. Coordinate shared access to workspaces.

- c. Provide overall coordination of temporary facilities and controls.
  - d. Approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
  - e. Coordinate construction and operations of the Work with work performed by each contract.
  - f. Coordinate sequencing and scheduling of the Work. Include the following:
    - 1) Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with separate contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
    - 2) Prepare a combined Contractor's Construction Schedule for entire Project. Secure time commitments for performing critical construction activities from separate contractors.
    - 3) Distribute copies of schedules to Architect, Owner, and separate contractors.
  - g. Coordinate schedule of tests and inspections.
  - h. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
  - i. Coordinate protection of the Work.
  - j. Coordinate completion of interrelated punch list items.
  - k. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
  - l. Collect Record CAD Drawings.
  - m. Collect Record Specification Sections from contractors, collate Sections into numeric order, and submit complete set.
  - n. General waste disposal facilities.
  - o. Provide photographic documentation.
  - p. Provide quality assurance and quality control services specified in Division 1 Section "Quality Requirements."
  - q. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
2. Responsibilities of Project Coordinator for temporary facilities and controls include, but are not limited to, the following:
- a. Unpiped temporary toilet fixtures, wash facilities, and drinking water facilities, including disposable supplies.
  - b. Project identification and temporary signs.

## 1.5 GENERAL REQUIREMENTS OF CONTRACTS

- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.
1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
  2. Local custom and trade union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
  3. Trenches for the Work of each contract shall be provided by each contract for its own Work.
  4. Cutting and Patching: Provided by each contract for its own Work.
  5. Within five working days after preliminary horizontal bar-chart-type construction schedule submittal has been received from Project Coordinator, submit a matching preliminary horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
  6. Project closeout requirements provided by each Contract for its own work.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.
1. Project Coordinator shall coordinate substitutions.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 1 Section "Temporary Facilities and Controls," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
  2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
  3. Its own field office, if required, complete with necessary furniture, utilities, and telephone service.
  4. Its own storage and fabrication sheds.
  5. Hoisting facilities for its own construction activities.

6. Legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
  7. Progress cleaning of its own areas on a daily basis to dumpster provided by Construction Manager.
  8. Secure lockup of its own tools, materials, and equipment.
  9. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
  10. Dewatering facilities and drains.
  11. Excavation support and protection, unless required solely for the Work of another contract.
  12. Special or unusual hoisting requirements fro construction activities, including hoisting loads in excess of 2 tons, hoisting material or equipment into spaces below grade, and hoisting requirements outside building enclosures.
  13. Temporary stairs.
  14. Barricades, warning signs, and lights.
- D. Use Charges for water service and electric power service, if required, shall be paid by each contractor. .
- E. Electrical Contract
1. Work in the Electrical Contract includes, but is not limited to the following:
    - a. Electrical rough-in

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01125**

**SECTION 01200 – PROJECT MEETINGS****PART 1 - GENERAL****1.1 SECTION DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:
  - 1. Pre-Construction Conference.
  - 2. Pre-Installation Conference.
  - 3. Coordination Meetings.
  - 4. Progress Meetings.
- B. Construction schedules are specified in another Division 1 Section.

**1.3 PRE-CONSTRUCTION MEETING**

- A. A pre-construction conference and organizational meeting will be scheduled by the Construction Manager at the Project site or other convenient location no later than 15 days after Notice of Intent to Award and prior to commencement of construction activities.
- B. Attendance Required: The Owner, Architect, Construction Manager, and their consultants, the Prime Contractors and their superintendents, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.
- C. Agenda: Discuss items of significance that could affect progress including such topics as:
  - 1. Tentative construction schedule.
  - 2. Critical Work sequencing.
  - 3. Designation of responsible personnel.
  - 4. Procedures for processing field decisions and Change Orders
  - 5. Procedures for processing Applications for Payment.

6. Distribution of Contract Documents
  7. Submittal of Shop Drawings, Product Data and Samples.
  8. Preparation of record documents.
  9. Use of premises.
  10. Office, Work and storage areas.
  11. Equipment deliveries and priorities.
  12. Safety Procedures
  13. First Aid
  14. Security
  15. Housekeeping
  16. Working hours.
- D. Construction Manager shall record minutes and distribute copies to participants within five (5) days.

#### 1.4 PRE-INSTALLATION CONFERENCES

- A. Conduct a pre-installation conference at the site before each construction activity that requires special coordination with other construction. The installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
    - a. Contract Documents
    - b. Options
    - c. Related Change Orders
    - d. Purchases
    - e. Deliveries
    - f. Shop Drawings, Product Data and quality control samples
    - g. Possible conflicts
    - h. Compatibility problems
    - i. Time Schedules
    - j. Weather limitations
    - k. Manufacturer's recommendations
    - l. Compatibility of materials
    - m. Acceptability of substrates
    - n. Temporary facilities
    - o. Space and access limitations
    - p. Governing regulations
    - q. Safety
    - r. Inspection and testing requirements
    - s. Required performance results

- t. Recording requirements
  - u. Protection
- B. Construction Manager shall record discussions and agreements and disagreements of each conference along with the approved schedule and distribute the record of the meeting to everyone concerned within five (5) days.

### 1.5 COORDINATION MEETINGS

- A. Construction Manager will conduct project coordination meetings which will be held at regularly scheduled times. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.
- B. Representation at each meeting is required by every party currently involved in coordination or planning for the construction activities involved.
- C. Meeting results will be distributed to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

### 1.6 PROGRESS MEETINGS

- A. Construction manager will conduct progress meetings, which will be held at the Project site at regularly scheduled intervals.
- B. Attendees: In addition to the Construction Manager, each prime contractor, supplier or other entity currently working on the project or involved in planning, coordination or performance of future activities shall be represented at these meetings by persons familiar with the Project and authorized to conclude matters relating to progress.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.
  - 1. Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed with the Contract Time
  - 2. Review the present and future needs of each entity present, including such items as:



- a. Interface requirements.
- b. Time
- c. Sequences
- d. Deliveries
- e. Off-site fabrication problems
- f. Access
- g. Site Utilization
- h. Temporary facilities and services
- i. Hours of Work
- j. Hazards and risks
- k. Housekeeping
- l. Quality and Work standards
- m. Change Orders
- n. Documentation of information for payment requests.

- D. Reporting: No later than five (5) days after each progress meeting date, minutes of the meeting will be distributed, by the Construction Manager, to each party present and to other parties who should have been present.

**PART 2 - PRODUCTS (NOT USED)**

**PART 3 - EXECUTION (NOT USED)**

**END OF SECTION 01200**

**SECTION 01230 - ALTERNATES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for alternates.

**1.3 DEFINITIONS**

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

**1.4 PROCEDURES**

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 SCHEDULE OF ALTERNATES**

**END OF SECTION 01230**

**SECTION 01250 - CONTRACT MODIFICATION PROCEDURES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
  - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

**1.3 MINOR CHANGES IN THE WORK**

- A. Minor change in work shall be authorized on IDOT standard forms in accordance with IDOT standard specs.

**1.4 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Construction Manager are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

- b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - c. Include costs of labor and supervision directly attributable to the change.
  - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Construction Manager.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use Standard IDOT Forms.

## 1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on Standard IDOT Forms.

## 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on Standard IDOT Forms. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01250**

**SECTION 01270 - UNIT PRICES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
  - 2. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.

**1.3 DEFINITIONS**

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

**1.4 PROCEDURES**

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION**

**3.1 LIST OF UNIT PRICES**

**END OF SECTION 01270**



**SECTION 01290 - PAYMENT PROCEDURES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

**1.3 DEFINITIONS**

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

**1.4 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with Continuation Sheets.
    - b. Submittals Schedule.
    - c. Contractor's Construction Schedule.

2. Submit the Schedule of Values to Architect through Construction Manager at earliest possible date but no later than five days before the date scheduled for submittal of initial Applications for Payment.
  3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  2. Submit draft of AIA Document G703 Continuation Sheets.
  3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value.
      - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
  4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.

7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

## 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Progress payments shall be submitted to Construction Manager by the 25<sup>th</sup> of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Payment Application Forms: Use Standard IDOT Forms for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
  1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

- F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Products list.
  5. Schedule of unit prices.
  6. Submittals Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds.
  15. Data needed to acquire Owner's insurance.
  16. Initial settlement survey and damage report if required.

- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
  
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  9. Final, liquidated damages settlement statement.

**PART 2 - PRODUCTS (Not Used)****PART 3 - EXECUTION (Not Used)****END OF SECTION 01290**

**SECTION 01300 - SUBMITTALS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements for submittals in addition to the requirements of the Standard Specifications for Road and Bridge Construction required for performance of the Work, including:
1. Submittal schedule.
  2. Shop Drawings.
  3. Product Data.
  4. Samples.

**1.2 SUBMITTAL PROCEDURES**

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
  2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
    - a. Allow sufficient time for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
    - b. If an intermediate submittal is necessary, process the same as the initial submittal.
    - c. Allow two weeks for reprocessing each submittal.

- d. No extension of Contract Time will be authorized because of failure to transmit submittals to Architect sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide a space approximately 4"x4" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
  2. Include the following information on the label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect, General contractor and Owner.
    - d. Name and address of Contractor.
    - e. Name and address of subcontractor.
    - f. Name and address of supplier.
    - g. Name of manufacturer.
    - h. Number and title of appropriate Specification Section.
    - i. Drawing number and detail references, as appropriate.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from General Contractor to Architect using a transmittal form. Submittals received from sources other than the General Contractor will be returned without action.
1. On the Transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include General Contractor's certification that information complies with Contract Document requirements.

### 1.3 SUBMITTAL SCHEDULE

- A. Submit four copies of a submittal schedule within 10 days after contract acceptance.
1. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.
  2. Prepare the schedule in chronological order; include submittals required during the first 90 days of construction. Provide the following information:

- a. Scheduled date for the first submittal.
  - b. Related Section number.
  - c. Submittal category.
  - d. Name of subcontractor.
  - e. Description of the part of the Work covered.
- B. Distribution: Following response to initial submittal, when revisions are made, submit four copies to the Architect.
- C. Schedule Updating: The Contractor shall revise the schedule after each meeting or activity, where revisions have been recognized or made.

#### 1.4 SHOP DRAWINGS

- A. Submit eight copies of newly prepared information, drawn to accurate scale, except in the case of full size drawings submit one reproducible and one blueline copy. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered Shop Drawings.
- B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
1. Dimensions.
  2. Identification of products and materials included.
  3. Compliance with specified standards.
  4. Notation of coordination requirements.
  5. Notation of dimensions established by field measurement.
  6. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 36" x 48".
  7. Submittals: Submit one correctable translucent reproducible print and four blue- or black-line prints for review; the reproducible print will be returned.
  8. General Contractor shall print and distribute appropriate number of copies for distribution to appropriate parties.
  9. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
  10. Allow a 4"x4" space for Architectural action stamp.



- C. Coordination Drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.
  - 1. Submit Coordination Drawings for integration of different construction elements. Show sequences and relationships of separate components to avoid conflicts in use of space.

## 1.5 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as "Shop Drawings."
  - 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
    - a. Manufacturer's printed recommendations.
    - b. Compliance with recognized trade association standards.
    - c. Compliance with recognized testing agency standards.
    - d. Application of testing agency labels and seals.
    - e. Notation of dimensions verified by field measurement.
    - f. Notation of coordination requirements.
  - 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
  - 3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
  - 4. Submittals: Submit four copies of each required submittal; one copy will be returned with action taken and corrections or modifications required.
    - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
  - 5. Distribution: Duplicate and distribute copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities.

- a. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
- b. Do not permit use of unmarked copies of Product Data in connection with construction.

## 1.6 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's Sample. Include the following:
    - a. Generic description of the Sample.
    - b. Sample source.
    - c. Product name or name of manufacturer.
    - d. Compliance with recognized standards.
    - e. Availability and delivery time.
  2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
    - a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
    - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
    - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
  3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
    - a. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
  4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.
  5. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

- a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
  - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.
    - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

## 1.7 GENERAL CONTRACTOR'S RESPONSIBILITIES

- A. Review shop drawings, product data, samples, material, product or equipment prior to submission and stamp reviewed.
- B. Submittals without General Contractor's stamp of review will not be reviewed and will be returned for resubmission.
- C. Verify:
  1. Field measurements.
  2. Field construction criteria.
  3. Catalog numbers and similar data.
  4. Quantities.
- D. Coordinate each submittal with requirements of Project Construction Schedule and Contract Documents.
- E. General Contractor's responsibility regarding errors and omissions in submittals is not relieved by Architect's review of submittals.
- F. Subcontractor's responsibility regarding deviations in submittals from requirements of Contract Documents is not relieved by the General Contractor or the Architect's review of submittals, unless Architect gives written acceptance of specific deviations as approved by Owner.

- G. When work is directly related and involves more than one trade, shop drawings shall be coordinated by the General Contractor with other trades prior to submission. The submission and related work shall be submitted under one cover.
- H. After a shop drawing has been submitted for review, no changes may be made to that Drawing other than changes resulting from review notes made by the Architect unless such changes are clearly identified and circled before being resubmitted. Any failure to comply with this requirement shall nullify and invalidate the Architect's review.

#### **1.8 REVIEW PROCEDURE: BY ARCHITECT/ENGINEER**

- A. Stamped Reviewed, No Exceptions Taken, No corrections or resubmission's required, fabrication may proceed.
- B. Stamped Exceptions Noted, Resubmittal Not Required.
  - 1. If Contractor/Subcontractor complies with noted corrections, fabrication may proceed.
  - 2. If for any reason the Contractor/Subcontractor cannot comply with the noted corrections, fabrication shall not proceed and Contractor/Subcontractor shall resubmit, following procedures outlined hereinbefore.
- C. Stamped Revise and Resubmit As Noted, or Rejected.
  - 1. Contractor/Subcontractor shall revise and resubmit for review. Fabrication shall not proceed.

#### **1.9 RESUBMISSION REQUIREMENTS**

- A. Shop Drawings:
  - 1. Revise or produce new shop drawings as required and resubmit as specified for initial submittal.
  - 2. Identify on drawings all changes which have been made on documents.
- B. Material/Product or Equipment Samples:
  - 1. Submit new samples as directed via initial submittal requirements.

#### **PART 2 - PRODUCTS**

(Not Applicable)

**PART 3 - EXECUTION**

(Not Applicable)

**END OF SECTION 01300**

**SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination Drawings.
  - 2. Administrative and supervisory personnel.
  - 3. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.
- C. Related Sections include the following:
  - 1. Division 1 Section "Summary of Multiple Contracts" for a description of the division of Work among separate contracts and responsibility for coordination activities not in this Section.
  - 2. Division 1 Section "Execution Requirements" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.

**1.3 COORDINATION**

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
- B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its

operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
  4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- C. Prepare memoranda for distribution to Construction Manager outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
  2. Installation and removal of temporary facilities and controls.
  3. Delivery and processing of submittals.
  4. Progress meetings.
  5. Preinstallation conferences.
  6. Project closeout activities.

#### 1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, and electrical systems.
    - b. Indicate required installation sequences.
    - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements.



Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes will not be considered changes to the Contract.

2. Sheet Size: At least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
  3. Number of Copies: Submit two opaque copies of each submittal. Architect, through Construction Manager, will return one copy.
  4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

#### **1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL**

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

#### **1.6 PROJECT MEETINGS**

- A. General: Construction Manager will schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Construction Manager will inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
  2. Agenda: Construction Manager will prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Construction Manager will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect.
- B. Preconstruction Conference: Construction Manager will schedule a preconstruction conference before starting construction, at a time convenient to Owner and Architect, to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Critical work sequencing and long-lead items.
    - c. Designation of key personnel and their duties.
    - d. Procedures for processing field decisions and Change Orders.
    - e. Procedures for requests for interpretations (RFIs).
    - f. Procedures for testing and inspecting.
    - g. Procedures for processing Applications for Payment.
    - h. Distribution of the Contract Documents.
    - i. Submittal procedures.
    - j. Preparation of Record Documents.
    - k. Use of the premises.
    - l. Work restrictions.
    - m. Owner's occupancy requirements.
    - n. Responsibility for temporary facilities and controls.
    - o. Construction waste management and recycling.
    - p. Parking availability.
    - q. Office, work, and storage areas.
    - r. Equipment deliveries and priorities.
    - s. First aid.
    - t. Security.
    - u. Progress cleaning.
    - v. Working hours.
  3. Minutes: Construction Manager will record and distribute meeting minutes.
- C. Preinstallation Conferences: Construction Manager will conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting.
  2. Agenda: Contractors shall review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. The Contract Documents.
    - b. Options.
    - c. Related requests for interpretations (RFIs).
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.

- h. Review of mockups.
  - i. Possible conflicts.
  - j. Compatibility problems.
  - k. Time schedules.
  - l. Weather limitations.
  - m. Manufacturer's written recommendations.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
3. Construction Manager will record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- D. Progress Meetings: Construction Manager will conduct progress meetings at monthly intervals. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of Owner, Construction Manager, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Construction Manager will review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.

- b. Review present and future needs of each entity present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Status of submittals.
    - 4) Deliveries.
    - 5) Off-site fabrication.
    - 6) Access.
    - 7) Site utilization.
    - 8) Temporary facilities and controls.
    - 9) Work hours.
    - 10) Hazards and risks.
    - 11) Progress cleaning.
    - 12) Quality and work standards.
    - 13) Status of correction of deficient items.
    - 14) Field observations.
    - 15) Requests for interpretations (RFIs).
    - 16) Status of proposal requests.
    - 17) Pending changes.
    - 18) Status of Change Orders.
    - 19) Pending claims and disputes.
    - 20) Documentation of information for payment requests.
  3. Minutes: Construction Manager will record and distribute to Contractor the meeting minutes.
- E. Coordination Meetings: Construction Manager will conduct Project coordination meetings as required. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: As directed by Construction Manager.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the

schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.

c. Review present and future needs of each contractor present, including the following:

- 1) Interface requirements.
- 2) Sequence of operations.
- 3) Status of submittals.
- 4) Deliveries.
- 5) Off-site fabrication.
- 6) Access.
- 7) Site utilization.
- 8) Temporary facilities and controls.
- 9) Work hours.
- 10) Hazards and risks.
- 11) Progress cleaning.
- 12) Quality and work standards.
- 13) Change Orders.

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01310**

**SECTION 01330 - SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
  - 1. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
  - 2. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
  - 3. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
  - 4. Division 1 Section "Closeout Procedures" for submitting warranties.
  - 5. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 6. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

**1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information that requires Architect's and Construction Manager's responsive action.
- B. Informational Submittals: Written information that does not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements.

**1.4 SUBMITTAL PROCEDURES**

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals Schedule: Comply with requirements in Division 1 Section "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 10 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 days for initial review of each submittal.
- E. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.

- d. Name and address of Contractor.
  - e. Name and address of subcontractor.
  - f. Name and address of supplier.
  - g. Name of manufacturer.
  - h. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
  - i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, as appropriate.
  - l. Other necessary identification.
- F. Deviations: Encircle or otherwise specifically identify deviations from the Contract Documents on submittals.
- G. Additional Copies: Unless additional copies are required for final submittal, and unless Architect or Construction Manager observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect and Construction Manager.
- H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Construction Manager will return submittals, without review, received from sources other than Contractor.
- 1. Transmittal Form: Provide locations on form for the following information:
    - a. Project name.
    - b. Date.
    - c. Destination (To:).
    - d. Source (From:).
    - e. Names of subcontractor, manufacturer, and supplier.
    - f. Category and type of submittal.
    - g. Submittal purpose and description.
    - h. Specification Section number and title.
    - i. Drawing number and detail references, as appropriate.
    - j. Submittal and transmittal distribution record.
    - k. Remarks.
    - l. Signature of transmitter.



2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Use only final submittals.

#### **1.5 CONTRACTOR'S USE OF ARCHITECT'S CAD FILES**

- A. General: At Contractor's written request, copies of Architect's CAD files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
  1. The Architect will furnish a disk or tape which contains machine readable information in the form of a DXF neutral format file of contract drawings for the above referenced building
  2. The Architect's fee for releasing CAD Drawings is One Hundred Fifty Dollars (\$150.00) per sheet.
  3. The Contractor and the Architect will enter into a "CAD DISK TRANSFER AGREEMENT" prepared by the Architect, and containing the following provisions:
    - a. Because of the possibility that information and data delivered in machine readable form may be altered, whether inadvertently or otherwise, the Architect reserves the right to retain hard copy originals of the electronic documentation delivered to the Contractor in machine readable form, which originals shall be referred to and shall govern in the event of any inconsistency between the two.
    - b. The Contractor understands that the automated conversion (translation) of information and data from the system and format used by the Architect to an alternate system or format cannot be accomplished without the introduction of anomalies and/or errors. Therefore, and in consideration of the Architect's agreement to

deliver its instruments of professional service in machine readable form, the Contractor agrees to the fullest extent permitted by law to hold harmless and indemnify the Architect from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misinterpretation, misuse or reuse (to include any use by others) of the machine readable information and data provided by the Architect under this agreement. The foregoing indemnification applies, without limitation, to any use of the project documentation on other projects, for additions to this project or for completion of this project by others, with the only exception being for such use as may specifically be authorized, in writing by the Architect.

## **PART 2 - PRODUCTS**

### **2.1 ACTION SUBMITTALS**

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
  - 1. Submit electronic submittals directly to extranet specifically established for Project.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.
    - f. Wiring diagrams showing factory-installed wiring.
    - g. Printed performance curves.
    - h. Operational range diagrams.
    - i. Mill reports.
    - j. Standard product operation and maintenance manuals.
    - k. Compliance with specified referenced standards.
    - l. Testing by recognized testing agency.
    - m. Application of testing agency labels and seals.

- n. Notation of coordination requirements.
  4. Submit Product Data before or concurrent with Samples.
  5. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect, through Construction Manager, will return two copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal of Architect's CAD Drawings are otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Design calculations.
    - j. Compliance with specified standards.
    - k. Notation of coordination requirements.
    - l. Notation of dimensions established by field measurement.
    - m. Relationship to adjoining construction clearly indicated.
    - n. Seal and signature of professional engineer if specified.
    - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
  2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.
  3. Number of Copies: Submit five opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit seven copies where copies are required for operation and maintenance manuals. Architect and Construction Manager will retain two copies; remainder will be returned.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
  - a. Generic description of Sample.
  - b. Product name and name of manufacturer.
  - c. Sample source.
  - d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect and Construction Manager will retain two Sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

- 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
  2. Number and name of room or space.
  3. Location within room or space.
  4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
    - a. Mark up and retain one returned copy as a Project Record Document.
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation" for Construction Manager's action.
- G. Submittals Schedule: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- H. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- I. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
  4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect, through Construction Manager, will return two copies.
    - a. Mark up and retain one returned copy as a Project Record Document.

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
  - 1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect and Construction Manager will not return copies.
  - 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
  - 3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- D. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

- J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
1. Name of evaluation organization.
  2. Date of evaluation.
  3. Time period when report is in effect.
  4. Product and manufacturers' names.
  5. Description of product.
  6. Test procedures and results.
  7. Limitations of use.
- K. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- L. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- M. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- N. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- O. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Operation and Maintenance Data."
- P. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- Q. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

1. Preparation of substrates.
  2. Required substrate tolerances.
  3. Sequence of installation or erection.
  4. Required installation tolerances.
  5. Required adjustments.
  6. Recommendations for cleaning and protection.
- R. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- S. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- T. Material Safety Data Sheets (MSDSs): Submit information directly to Construction Manager; do not submit to Architect.
1. Architect will not review submittals that include MSDSs and will return them for resubmittal.

### 2.3 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, for each product and system



specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

### **PART 3 - EXECUTION**

#### **3.1 CONTRACTOR'S REVIEW**

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### **3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION**

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Construction Manager will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

**END OF SECTION 01330**

**SECTION 01400 - QUALITY CONTROL SERVICES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements for quality control services.
- B. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the General Contractor. They do not include Contract enforcement activities performed by Owner.
- C. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve the General Contractor of responsibility for compliance with Contract Document requirements.
- D. Requirements of this Section relate to customized fabrication and installation procedures, not production of standard products.
  - 1. Specific quality control requirements for individual construction activities are specified in the Sections that specify those activities. Those requirements, including inspections and tests, cover production of standard products as well as customized fabrication and installation procedures.
  - 2. Inspections, test and related actions specified are not intended to limit the General Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
  - 3. Requirements for the General Contractor to provide quality control services required by Owner, or authorities having jurisdiction are not limited by provisions of this Section.

**1.2 RESPONSIBILITIES**

- A. General Contractor Responsibilities: The General Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity. Costs for these services shall be included in the Contract Sum.

1. The General Contractor shall employ and pay an independent agency to perform all specified quality control services.
  2. Retesting: The General Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the General Contractor's responsibility.
    - a. Cost of retesting construction revised or replaced by the General Contractor is the General Contractor's responsibility, where required tests were performed on original construction.
  3. Associated Services: The General Contractor shall cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
    - a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
    - b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
    - c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
    - d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
    - e. Security and protection of samples and test equipment at the Project site.
- B. Duties of the Testing Agency: The independent testing agency engaged to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the General Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.
1. The agency shall notify General Contractor and Architect promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
  3. The agency shall not perform any duties of the General Contractor.
- C. Coordination: The General Contractor and each agency engaged to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, the General Contractor and each agency shall coordinate activities to avoid the

necessity of removing and replacing construction to accommodate inspections and tests.

1. The General Contractor is responsible for coordinating times for inspections, tests, taking samples, and similar activities.

### 1.3 SUBMITTALS

- A. General: Submit the following in accordance with Contract Documents and Specification Section 01300.
- B. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the General Contractor, in duplicate, unless the Subcontractor is responsible for the service. If the Subcontractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the General Contractor, in duplicate.
  1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
  2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:
    - a. Date of issue.
    - b. Project title and number.
    - c. Name, address and telephone number of testing agency.
    - d. Dates and locations of samples and tests or inspections.
    - e. Names of individuals making the inspection or test.
    - f. Designation of the Work and test method.
    - g. Identification of product and Specification Section.
    - h. Complete inspection or test data.
    - i. Test results and an interpretation of test results.
    - j. Ambient conditions at the time of sample-taking and testing.
    - k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
    - l. Name and signature of laboratory inspector.
    - m. Recommendations on retesting.

### 1.4 QUALITY ASSURANCE

- A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are prequalified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by authorities having jurisdiction to operate in the State in which the Project is located.

## **PART 2 - PRODUCTS**

(Not Applicable)

## **PART 3 - EXECUTION**

### **3.1 REPAIR AND PROTECTION**

- A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes.
- B. Protect construction exposed by or for quality control service activities, and protect repaired construction.
- C. Repair and protection is the General Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing or similar services.

**END OF SECTION 01400**

**SECTION 01420 - REFERENCES****PART 1 - GENERAL****1.1 DEFINITIONS**

- A. General: Basic Contract definitions are included in the Conditions of the Contract. The following definitions apply to Divisions 1 through 16 of the Specifications. Should a conflict arise between Division 0 definitions and those of this Section, submit a description of the conflict implications to the Architect for resolution.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

## 1.2 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents, unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board <a href="http://www.access-board.gov">www.access-board.gov</a>	(800) 872-2253 (202) 272-0080
FS	Federal Specification Available from Department of Defense Single Stock Point <a href="http://www.dodssp.daps.mil">www.dodssp.daps.mil</a>	(215) 697-6257
	Available from General Services Administration <a href="http://www.apps.fss.gsa.gov/pub/fedspecs/index.cfm">www.apps.fss.gsa.gov/pub/fedspecs/index.cfm</a>	(202) 619-8925
	Available from National Institute of Building Sciences <a href="http://www.nibs.org">www.nibs.org</a>	(202) 289-7800

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ACI	American Concrete Institute/ACI International www.aci-int.org	(248) 848-3700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America www.agc.org	(703) 548-3118
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International)	(800) 843-2763 (212) 591-7722



	www.asme.org	
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9585
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
FM	Factory Mutual System (See FMG)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864 (847) 577-7200
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NFPA	NFPA International (National Fire Protection Association International) www.nfpa.org	(800) 344-3555 (617) 770-3000
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010

SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
UL	Underwriters Laboratories Inc. www.ul.com	(800) 704-4050 (847) 272-8800

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

BOCA	BOCA International, Inc. www.bocai.org	(708) 799-2300
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- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
EPA	Environmental Protection Agency www.epa.gov	(202) 260-2090
FAA	Federal Aviation Administration www.faa.gov	(202) 366-4000
GSA	General Services Administration www.gsa.gov	(202) 708-5082
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999

- E. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-

site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CAPUC	(See CPUC)	
CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation <a href="http://www.dca.ca.gov/bhfti">www.dca.ca.gov/bhfti</a>	(800) 952-5210 (916) 574-2041
CPUC	California Public Utilities Commission <a href="http://www.cpuc.ca.gov">www.cpuc.ca.gov</a>	(415) 703-2782
TFS	Texas Forest Service Forest Products Laboratory <a href="http://www.txforestsERVICE.tamu.edu">www.txforestsERVICE.tamu.edu</a>	(936) 639-8180

**PART 2 - PRODUCTS (Not Used)**

**PART 3 - EXECUTION (Not Used)**

**END OF SECTION 01420**

**SECTION 01441 - CONTRACTOR'S QUALITY PROGRAM REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.
- B. The Contractor shall develop a quality program, which describes the Contractor's organization, procedures, and processes for quality assurance and quality control of all aspects of the work scope. The quality program shall be documented to the Construction Manager. The program shall assure adequate quality throughout all areas of contract performance; for example, shop drawing/detailing, procurement of materials, receiving, storage, fabrication, assembly, inspection, testing, shipping, and site installation.
- C. The program shall provide for the prevention and ready detection of discrepancies and for timely and positive corrective action.
- D. Instructions and records for quality must be maintained and kept available for Construction Manager's review.

**PART 2 - QUALITY MANAGEMENT**

- A. The Contractor's organization for effective management for quality shall be clearly prescribed by the Contractor. Personnel performing quality functions shall have sufficient, well-defined responsibility, authority and the organizational freedom to identify and evaluate quality problems and to initiate, recommend or provide solutions.
- B. The Contractor's quality assurance personnel shall have the authority and responsibility to stop work if safety of personnel or damage to equipment is imminent.
- C. The Contractor shall provide and maintain clear and complete documented instructions to implement requirements of engineering drawings and specifications and to provide explicit direction to personnel, when such as appropriate to assure quality fabrication, assembly, or installation of complicated, sensitive, or delicate materials and equipment.

- D. The Contractor's records for monitoring work performance and for inspection, measurement, and testing shall indicate the acceptability of work or materials and the action taken in connection with deficiencies.

### **PART 3 - DESIGN DOCUMENT CONTROL**

- A. The Contractor shall maintain a design document change control system, which will assure that, outdated and superseded drawings, specifications, and instructions are not used in the work.

### **PART 4 - CONTROL OF PURCHASES**

- A. The Contractor is responsible for assuring that all materials, equipment, and services procured from his suppliers (subcontractors and vendors) conform to the contract requirements.
- B. The Contractor's responsibility for the control of purchases shall include the establishment of a procedure for:
  - 1. the selection of qualified suppliers,
  - 2. the transmission of applicable design and quality requirements in the contracts and associated technical requirements, and
  - 3. evaluation of the adequacy of procured items.
- C. Contractor shall inspect and test (if required by the contract) purchased materials and equipment to verify conformance to applicable requirements. The extent of inspection shall be consistent with the nature and intended application of the material and equipment.

### **PART 5 - SHIPPING, RECEIVING, HANDLING AND STORAGE**

- A. The Contractor's quality program shall provide for adequate work and inspection instructions for shipping, receiving, handling, storage, and preservation to protect the quality of materials and equipment, and prevent damage, loss, deterioration, degradation, or substitution of materials.
- B. Before any major fabricated assembly is shipped from the Contractor's facility, an OK to Ship authorization shall be obtained from the Construction Manager.
- C. All work shall be done in accordance with the specifications. Any request for use of alternate or non-conforming materials shall be presented to the Construction Manager for review and approval or rejection.

**PART 6 - CONTROL OF FABRICATION, ASSEMBLY AND INSTALLATION**

- A. The Contractor shall plan, document and implement a program which will assure that each phase of fabrication, assembly and installation meets and maintains the requirements of applicable drawings and specifications.
- B. The Contractor's quality program shall assure that all fabrication, assembly and installation of materials and equipment is accomplished under controlled conditions.
- C. Controls shall be established to ensure that only conforming materials are released and used.
- D. Fabrication, inspection, and installation and test areas shall be controlled to provide proper cleanliness levels for work areas, work surfaces, tools, fixtures, handling, storage and shipping containers, and test and inspection equipment to prevent contamination.
- E. When required by the contract, Contractor personnel, or their subcontracted personnel, performing or controlling certain critical fabrication, assembly, installation and inspection processes shall be qualified proficient. Qualification of personnel shall be based on demonstrated proficiency which will include training and testing. Examples of critical processes include welding, X-raying, and ultrasonic testing.

**PART 7 - INSPECTION AND TESTING**

- A. The Contractor shall use and maintain calibrated measuring, test and inspection equipment of suitable range, accuracy and type to assure conformance of materials and equipment to technical requirements. All measuring, test and inspection equipment used to accept or install equipment/materials shall be certified against a standard having greater accuracy and is traceable to National Standards.
- B. When transits, levels, theodolites, tapes, scales, gauges, templates, production jigs, fixtures, tooling masters, and such other devices are used for testing and measuring, they shall be proved for accuracy prior to release for use. These devices shall be proved again for accuracy at intervals formally established in a manner to cause their timely adjustment, replacement or repair prior to becoming inaccurate.

**END OF SECTION 01441**

**SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
  - 1. Division 1 Section "Summary" for limitations on utility interruptions and other work restrictions.
  - 2. Division 1 Section "Summary of Multiple Contracts" for division of responsibilities for temporary facilities and controls.
  - 3. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
  - 4. Division 1 Section "Execution Requirements" for progress cleaning requirements.
  - 5. Divisions 2 through 16 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
  - 6. Division 2 Section "Dewatering" for disposal of ground water at Project site.

**1.3 USE CHARGES**

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum.
- B. Water and Electric Power Service: Use charges are specified in Division 1 Section "Summary of Multiple Contracts."
- C. Water Service: Water service is not available to the project site. Each Contractor shall provide connections and extensions of services as required for its construction operations.
- D. Electric Power Service: Electric power service is not available to the project site. Each Contractor shall provide connections and extensions of services as required for its construction operations.

**1.4 SUBMITTALS**

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

**1.5 QUALITY ASSURANCE**

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

**PART 2 - PRODUCTS****2.1 MATERIALS****2.2 TEMPORARY FACILITIES**

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

**2.3 EQUIPMENT**

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Heating Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**PART 3 - EXECUTION****3.1 INSTALLATION, GENERAL**

- A. Each contractor shall provide facilities as required for their own work where they will serve Project adequately and result in minimum interference with



performance of the Work. Relocate and modify facilities as required by progress of the Work.

- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service if required.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- D. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service underground, unless otherwise indicated.
- E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  - 2. Install lighting for Project identification sign.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.

- B. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- C. Waste Disposal Facilities: Construction Manager will provide waste-collection containers in sizes adequate to handle waste from construction operations.
- D. Lifts and Hoists: Each Contractor shall provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- E. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

### **3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Division 1 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Earthwork Contractor shall provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Stormwater Control: Comply with authorities having jurisdiction. Earthwork Contractor shall provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Barricades, Warning Signs, and Lights: Each Contractor shall comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

**3.5 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain any temporary facilities in good operating condition until removal.
  - 1. Maintain operation of heating, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 1 Section "Closeout Procedures."

**END OF SECTION 01500**

**SECTION 01501 - TEMPORARY FACILITIES - MULTIPLE PRIME CONTRACTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.
- B. Temporary utilities required include but are not limited to:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
- C. Temporary construction and support facilities required include but are not limited to:
  - 1. Temporary heat.
  - 2. Field offices and storage sheds.
  - 3. Sanitary facilities, including drinking water.
  - 4. Temporary enclosures.
  - 5. Hoists.
  - 6. Waste disposal services.
  - 7. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities required include but are not limited to:
  - 1. Temporary fire protection.
  - 2. Barricades, warning signs, lights.
  - 3. Sidewalk bridge or enclosure fence for the site.
  - 4. Environmental protection.

**1.3 DIVISION OF RESPONSIBILITIES**

- A. General: Each prime Contractor is assigned specific responsibilities for certain temporary services and facilities used by other prime Contractors, and other entities at the site.

- B. Each prime Contractor is responsible for:
1. Installation, operation, maintenance and removal of each temporary service or facility usually considered as its own normal construction activity.
  2. Plug-in electric power cords and extension cords, and supplementary plug-in task lighting and special lighting necessary exclusively for its own activities.
  3. Its own field office, complete with necessary furniture, utilities and telephone service.
  4. Its own storage and fabrication sheds.
  5. Its own hoisting requirements.
  6. Collection and disposal of its own hazardous, dangerous, unsanitary or other harmful waste material.
  7. Secure lockup of its own tools, materials and equipment.
  8. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
  9. Barricades, warning signs lights.
  10. Environmental protection.
  11. Temporary heat and or winter protection required to perform his work.
  12. Temporary toilets, drinking water and dumpsters for its own use.
  13. Cleanup and removal of debris.
  14. Safety railings and barriers associated with his work.
  15. Temporary fire protection.
  16. Temporary chain-link fence.
  17. Temporary Power for its own use.
  18. Temporary Lighting for its own use.

#### 1.4 USE CHARGES (NOT USED)

#### 1.5 QUALITY ASSURANCE

- A. Regulations: Each Prime Contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction, including but not limited to:
1. Building code requirements.
  2. Health and safety regulations.
  3. Utility company regulations.
  4. Police, Fire Department and Rescue Squad rules.
  5. Environmental protection regulations.
- B. Standards: Each prime Contractor shall comply with NFPA Code 241, "Building Construction and Demolition Operations", ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC for industry recommendations.
  2. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.
  3. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).
- C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

## 1.6 PROJECT CONDITIONS (NOT USED)

## PART 2 - PRODUCTS

### 2.1 MATERIALS (NOT USED)

### 2.2 EQUIPMENT

- A. General: Each prime Contractor shall provide new equipment; if acceptable to Construction Manager, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for the use intended.
- B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. long, with pressure rating greater than the maximum pressure of the water distribution system; provide adjustable shut-off nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 125 volt AC plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords, no less than 50 feet long; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination, minimum of one lamp per each room. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Offices: Each prime Contractor shall provide its own prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows and serviceable finishes.
- H. Temporary Toilet Units: Provide self-contained single- occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.
- I. First Aid Supplies: Comply with regulations of authorities having jurisdiction.
- J. Fire Extinguishers: Provide hand-carried, portable, UL-rated, class A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended types for the exposures.
  - 1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Use qualified personnel for installation of temporary facilities. Locate facilities where they serve the project adequately and result in minimum interference with performance of construction activities. Relocate and modify facilities as required.
- B. Each prime Contractor shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed, or are replaced by authorized use of completed permanent facilities.

**3.2 TEMPORARY UTILITY INSTALLATION (NOT USED)****3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION**

- A. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access as directed by the Construction Manager.
1. Maintain temporary construction and support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Construction Manager.
- B. Provide incombustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
- C. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations, or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
- D. Heating Facilities: Except where use of the permanent system is authorized, provide properly vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, or open burning or salamander type heating units is prohibited.
- E. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
- F. Toilets: Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
- G. Drinking Water Facilities: Provide containerized tap-dispenser bottled-water type drinking water units, including paper supply.



- H. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations and construction free of water.
- I. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
  - 1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  - 2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
  - 3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
  - 4. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL labeled, fire-retardant treated material for framing and main sheathing.
- J. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- K. Temporary Elevator Use: Will not be allowed.
- L. Temporary Site Lighting: (Not used.)
- M. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. General: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by Construction Manager.

- B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities, install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."
1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.
  3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.
  4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
- C. Permanent Fire Protection: (Not used.)
- D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public, of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.
- E. Enclosure Fence: (Not used.)
- F. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.
- G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

**3.5 OPERATION, TERMINATION AND REMOVAL**

- A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities and good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour day basis where required to achieve indicated results and to avoid possibility of damage.
  - 2. Protection: Prevent water filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Termination and Removal: Unless Construction Manager requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace Work which cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of each prime Contractor. Owner reserves the right to take possession of project identification signs.
  - 2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances, which might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at the temporary entrances, as required by the governing authority.
  - 3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period.

**END OF SECTION 01501**

**SECTION 01600 - PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
  - 1. Division 1 Section "References" for applicable industry standards for products specified.
  - 2. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
  - 3. Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

**1.2 DEFINITIONS**

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by General Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

### 1.3 SUBMITTALS

- A. Product List: Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
  - 1. Coordinate product list with General Contractor's Construction Schedule and the Submittals Schedule.
  - 2. Form: Tabulate information for each product under the following column headings:
    - a. Specification Section number and title.
    - b. Generic name used in the Contract Documents.
    - c. Proprietary name, model number, and similar designations.
    - d. Manufacturer's name and address.
    - e. Supplier's name and address.
    - f. Installer's name and address.
    - g. Projected delivery date or time span of delivery period.
    - h. Identification of items that require early submittal approval for scheduled delivery date.
  - 3. Initial Submittal: Within 10 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
    - a. At General Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
  - 4. Completed List: Within 30 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

5. Architect's Action: Architect will respond in writing to General Contractor within 10 days of receipt of completed product list. Architect's response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Architect's response, or lack of response, does not constitute a waiver of requirement to comply with the Contract Documents.
- B. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified material or product cannot be provided.
    - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    - i. Detailed comparison of General Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    - j. Cost information, including a proposal of change, if any, in the Contract Sum.
    - k. General Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

- I. General Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 10 days of receipt of a request for substitution. Architect will notify General Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
  - a. Form of Acceptance: Change Order.
  - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- C. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify General Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Division 1 Section "Submittal Procedures."
    - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
- D. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If General Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
  1. Each subcontractor is responsible for providing products and construction methods compatible with products and construction methods of other subcontractors.

2. If a dispute arises between subcontractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Store cementitious products and materials on elevated platforms.
  5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  7. Protect stored products from damage and liquids from freezing.

### 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve



General Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
  3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

## **PART 2 - PRODUCTS**

### **2.1 PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and

matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

- a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
- a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
  - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider General Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  2. Requested substitution does not require extensive revisions to the Contract Documents.
  3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  4. Substitution request is fully documented and properly submitted.
  5. Requested substitution will not adversely affect General Contractor's Construction Schedule.

6. Requested substitution has received necessary approvals of authorities having jurisdiction.
7. Requested substitution is compatible with other portions of the Work.
8. Requested substitution has been coordinated with other portions of the Work.
9. Requested substitution provides specified warranty.
10. If requested substitution involves more than one subcontractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

### 2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider General Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

### PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

**SECTION 01700 - PROJECT CLOSEOUT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General, Supplementary and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUBSTANTIAL COMPLETION**

- A. Contractor:
  - 1. Submit written notification to Construction Manager that project, or designated portion of project, is substantially complete. Include a list of all items to be completed or corrected for final completion.
- B. The Construction Manager will make an inspection after receipt of notification from Contractor that work is substantially complete.
- C. Should the Work be considered substantially complete:
  - 1. Construction Manager will prepare and issue a Certificate of Substantial completion, containing:
    - a. Date of substantial completion.
    - b. Contractor's list of items to be completed or corrected, certified and amended Architect's list requiring completion or correction.
    - c. The time within which Contractor shall complete or correct work of listed items.
    - d. Time and date Owner will assume possession of work or designated portion thereof.
    - e. Responsibilities of Owner and Contractor for:
      - 1) Insurance.
      - 2) Utilities.
      - 3) Operation of mechanical, electrical and other systems.
      - 4) Maintenance and cleaning.
      - 5) Security.
    - f. Signatures of:
      - 1) Construction Manager.
      - 2) Contractor.

- 3) Owner.
  - 4) Architect.
2. Owner occupancy of project or designated portion of project:
    - a. Contractor shall:
      - 1) Perform final cleaning.
    - b. Owner shall:
      - 1) Owner will occupy project, under provisions stated in Certificate of Substantial Completion.
  3. Contractor: complete work listed for completion or correction, and all other contract construction within designated time.
- D. Should Construction Manager and Architect consider that Work is not substantially complete:
1. Construction Manager shall notify Contractor.
  2. Contractor: Immediately complete work, and send second written notice to Construction Manager, notifying that project, or designated portion of project, is substantially complete.
  3. Construction Manager will reinspect work.

### 1.3 FINAL COMPLETION

- A. Contractor shall submit written notification to the Construction Manager that:
  1. Contract Documents have been reviewed.
  2. Project has been inspected for compliance with Contract Documents.
  3. Work has been completed in accordance with Contract Documents requirements.
  4. Equipment and systems have been tested in presence of Construction Manager, Architect and Owner's representative and are operational and approved by representatives.
  5. Project is completed, and ready for final inspection.
- B. Construction Manager assisted by the Architect will make final inspection.
- C. Should Construction Manager consider that work is finally complete in accordance with requirements of Contract Documents and all project closeout requirements are complete the Construction Manager will recommend final payment be made to the contractor

**1.4 CLOSEOUT SUBMITTALS**

- A. Project Record Documents: as required by General Conditions and Division 1 sections.
- B. Operation and Maintenance Data: as required by General Conditions and other Contract Documents.
- C. Warranties: as required by General Conditions and other Contract Documents.
- D. Parts and maintenance materials: as required by Specification Sections.
- E. Deliver Certificates of Compliance with requirements of governing authorities, as required.

**1.5 EVIDENCE OF PAYMENT AND RELEASE OF LIENS**

- A. Contractor shall duly complete the certification and waiver of lien included on the contract application for payment on each partial and final contract application for payment.

**1.6 FINAL APPLICATION FOR PAYMENTS**

- A. Contractor shall submit final application in accordance with requirements of General Conditions and other Contract Documents.

**1.7 FINAL CERTIFICATE FOR PAYMENT**

- A. Construction Manager will make recommendation for final payment.

**END OF SECTION 01700**

**SECTION 01740 - WARRANTIES AND BONDS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
1. General closeout requirements are included in Section 01770, Closeout Procedures.
  2. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 2 thru 16.
  3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the General Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the General Contractor.

**1.2 DEFINITIONS**

- A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
- B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

**1.3 WARRANTY REQUIREMENTS**

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written



endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The General Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

#### 1.4 SUBMITTALS

- A. General: Submit the following in accordance with Contract Documents and Specification Section 01300.
  - 1. Submit written warranties to the Architect prior to the date certified for Final Completion.
- B. When a special warranty is required to be executed by the General Contractor, or the General Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.
- C. Prepare a written document utilizing the appropriate form, ready for execution by the General Contractor, or the General Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Architect for approval prior to final execution.
  - 1. Refer to individual Sections for specific content requirements, and particular requirements for submittal of special warranties.

- D. Form of Submittal: At Final Completion compile two copies of each required warranty and bond properly executed by the General Contractor, or by the General Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- E. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.
  - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS, the Project title or name, and the name of the General Contractor.
  - 3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

## **PART 2 - PRODUCTS**

(Not Applicable)

## **PART 3 - EXECUTION**

### **3.1 SCHEDULE OF WARRANTIES**

- A. Schedule: Provide warranties and bonds on products and installations as specified in the various specification sections.

**END OF SECTION 01740**

**SECTION 01770 - CLOSEOUT PROCEDURES****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Warranties.
  - 2. Final cleaning.
  
- B. Related Sections include the following:
  - 1. Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 2. Divisions 2 through 16 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

**1.2 PRELIMINARY PROCEDURES:**

- A. Before requesting inspection for determining date of Final Completion, complete the following. List items below that are incomplete in request.
  - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  - 2. Advise Owner of pending insurance changeover requirements.
  - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 5. Prepare and submit Project Record Documents, operation and maintenance manuals.
  - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  - 8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  - 9. Complete final cleaning requirements.
  - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

**PART 3 - EXECUTION****3.1 FINAL CLEANING**

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Final Completion:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - c. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - d. Remove labels that are not permanent.
    - e. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
    - f. Replace parts subject to unusual operating conditions.

- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

**END OF SECTION 01770**

**SECTION 01781 - PROJECT RECORD DOCUMENTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  
- B. Related Sections include the following:
  - 1. Division 1 Section "Closeout Procedures" for general closeout procedures.
  - 2. Divisions 2 through 16 Sections for specific requirements for Project Record Documents of the Work in those Sections.

**1.2 SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal: Submit one set of marked-up Record Prints for review.
    - b. Final Submittal: Submit one set of marked-up Record Prints, one set of Record CAD Drawing files, one set of Record CAD Drawing plots, and three copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
  
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
  
- C. Record Product Data: Submit one copy of each Product Data submittal.
  - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

**PART 2 - PRODUCTS****2.1 RECORD DRAWINGS**

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or other Contract Modification.
    - k. Details not on the original Contract Drawings.
    - l. Field records for variable and concealed conditions.
    - m. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.

- B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:
1. Format: The Contract Drawings were prepared using AutoCAD 2002 on computers using Microsoft Windows 2000 Professional. Use the same version to and operating system to prepare Record CAD drawings.
  2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.
  4. Architect will furnish Contractor one set of CAD Drawings of the Contract Drawings for use in recording information.
    - a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Record CAD Drawings: Organize CAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each CAD file.
  3. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.



- e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
  - 5. Note related Change Orders and Record Drawings where applicable.

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

**PART 3 - EXECUTION****3.1 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
  
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's and General contractor's reference during normal working hours.

**END OF SECTION 01781**

**SECTION 02620 - SUBDRAINAGE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes subdrainage systems for the following:
  - 1. Foundations.
  - 2. Retaining walls.
- B. Related Sections include the following:
  - 1. Division 7 waterproofing Sections for molded-sheet drainage panels.

**1.3 DEFINITIONS**

- A. PE: Polyethylene plastic.
- B. PVC: Polyvinyl chloride plastic.
- C. Subdrainage: Drainage system that collects and removes subsurface or seepage water.

**1.4 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Perforated-wall pipe and fittings.
  - 2. Solid-wall pipe and fittings.
  - 3. Geotextile filter fabrics.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 PIPING MATERIALS**

- A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, tube, fitting, and joining materials.

**2.3 PERFORATED-WALL PIPES AND FITTINGS**

- A. Perforated PE Pipe and Fittings:
1. NPS 6 and Smaller: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
  2. NPS 8 and Larger: ASTM F 667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
  3. Couplings: Manufacturer's standard, band type.

**2.4 SOLID-WALL PIPES AND FITTINGS**

- A. Contractor's option: Use one of the following for pipes not required to be perforated
1. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.
    - a. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.
  2. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35, bell-and-spigot ends, for gasketed joints.
    - a. Gaskets: ASTM F 477, elastomeric seal.

**2.5 SPECIAL PIPE COUPLINGS**

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same

sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.

1. Sleeve Materials:
  - a. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
  - b. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
2. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

## 2.6 CLEANOUTS

- A. PVC Cleanouts: ASTM D 3034, PVC cleanout threaded plug and threaded pipe hub.

## 2.7 SOIL MATERIALS

- A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 2 Section "Earthwork."

## 2.8 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330-gpm/sq. ft. when tested according to ASTM D 4491.
  1. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament.
  2. Style(s): Flat and sock, as applicable by installation condition specified below.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

### 3.3 PIPING APPLICATIONS

- A. Underground Subdrainage Piping:
  - 1. Perforated PE pipe and fittings, couplings, and coupled joints.
- B. Header Piping:
  - 1. PE drainage tubing and fittings, couplings, and coupled joints, or
  - 2. PVC sewer pipe and fittings, couplings, and coupled joints.

### 3.4 CLEANOUT APPLICATIONS

- A. In Underground Subdrainage Piping:
  - 1. At Grade in Earth: PVC cleanouts.

### 3.5 FOUNDATION DRAINAGE INSTALLATION

- A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- B. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- C. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

- G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- I. Do not use drainage panels as protection for waterproof membrane unless approved by factory-authorized service representative of waterproofing membrane manufacturer. Submit approval if so used.
- J. Place initial backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

### 3.6 RETAINING-WALL DRAINAGE INSTALLATION

- A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- B. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than 4 inches.
- C. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.
- E. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- G. Place drainage course in layers not exceeding 3 inches in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- I. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

### 3.7 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
  - 1. Foundation Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 30 inches, unless otherwise indicated.
  - 2. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 30 inches, unless otherwise indicated. However, when water discharges through wall weep holes, pipe may be installed with a minimum slope of zero percent.
  - 3. Lay perforated pipe with perforations down.
  - 4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install PE piping according to ASTM D 2321.
- D. Install PVC piping according to ASTM D 2321.

### 3.8 PIPE JOINT CONSTRUCTION

- A. Join ABS pipe and fittings according to ASTM D 2751.
- B. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties."
- C. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26.4.2.4, "Joint Properties"; or according to ASTM D 2321.
- D. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.
- E. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.



### 3.9 CLEANOUT INSTALLATION

- A. Cleanouts for Foundation and Retaining-Wall Subdrainage:
  - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
  - 2. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches in depth. Set top of cleanout plug 1 inch above grade.

### 3.10 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.
- C. Where required, connect low elevations of foundation subdrainage to stormwater sump pumps.

### 3.11 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tapes directly over piping.
  - 1. Install detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.12 FIELD QUALITY CONTROL

- A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

### 3.13 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

**END OF SECTION 02620**

**SECTION 02751 - CEMENT CONCRETE PAVEMENT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes exterior cement concrete pavement for the following:

- 1. Curbs and gutters.
- 2. Walkways.
  - a. Natural color cement concrete
  - b. Colored cement concrete.
- 3. Unit paver base.

- B. Related Sections include the following:

- 1. Division 2 Section "Earthwork" for subgrade preparation, grading, and subbase course.
- 2. Division 2 Section "Unit Pavers" for pavers associated with cement concrete paving.
- 3. Division 2 Section "Pavement Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.
- 4. Division 3 Section "Cast-in-Place Concrete" for general building applications of concrete.

**1.3 DEFINITIONS**

- A. Cementitious Materials: Portland cement.

**1.4 SUBMITTALS**

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For manufacturer and testing agency.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
  - 1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Admixtures.
  - 4. Curing compounds.
  - 5. Applied finish materials.
  - 6. Bonding agent.
  - 7. Joint fillers.
- F. Minutes of preinstallation conference.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- C. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

- D. Mockups: Cast mockups of full-size sections of concrete pavement to demonstrate typical joints, surface finish, texture, color, and standard of workmanship.
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Obtain Architect's approval of mockups before starting construction.
  4. Maintain approved mockups during construction in an undisturbed condition as a standard for judging the completed pavement.
  5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete producer.
    - d. Concrete pavement subcontractor.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  - 1. Use flexible or curved forms for curves with a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

## 2.3 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

## 2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use one of the following cementitious materials, of the same type, brand, and source throughout the Project:
  - 1. Portland Cement: ASTM C 150, Type I/II, gray or white, as necessary for selected coloring agent.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate, uniformly graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar pavement applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
  - 1. Products:
    - a. Axim Concrete Technologies; Cimfilm.
    - b. Burke by Edeco; BurkeFilm.
    - c. ChemMasters; Spray-Film.
    - d. Conspec Marketing & Manufacturing Co., Inc.; Aquafilm.
    - e. Dayton Superior Corporation; Sure Film.
    - f. Euclid Chemical Company (The); Eucobar.
    - g. Kaufman Products, Inc.; Vapor Aid.
    - h. Lambert Corporation; Lambco Skin.
    - i. L&M Construction Chemicals, Inc.; E-Con.
    - j. MBT Protection and Repair, ChemRex Inc.; Confilm.
    - k. Meadows, W. R., Inc.; Sealtight Evapre.
    - l. Metalcrete Industries; Waterhold.
    - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
    - n. Sika Corporation, Inc.; SikaFilm.
    - o. Symons Corporation; Finishing Aid.

- p. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- 1. Products:
    - a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
    - b. Burke by Edoko; Aqua Resin Cure.
    - c. ChemMasters; Safe-Cure Clear.
    - d. Conspec Marketing & Manufacturing Co., Inc.; W.B. Resin Cure.
    - e. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
    - f. Euclid Chemical Company (The); Kurez DR VOX.
    - g. Kaufman Products, Inc.; Thinfilm 420.
    - h. Lambert Corporation; Aqua Kure-Clear.
    - i. L&M Construction Chemicals, Inc.; L&M Cure R.
    - j. Meadows, W. R., Inc.; 1100 Clear.
    - k. Nox-Crete Products Group, Kinsman Corporation; Resin Cure E.
    - l. Symons Corporation; Resi-Chem Clear.
    - m. Tamms Industries Inc.; Horncure WB 30.
    - n. Unitex; Hydro Cure 309.
    - o. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

## 2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
- 1. Manufacturers:
    - a. Bayer Corporation.
    - b. ChemMasters.
    - c. Conspec Marketing & Manufacturing Co., Inc.
    - d. Davis Colors.
    - e. Elementis Pigments, Inc.
    - f. Hoover Color Corporation.
    - g. Lambert Corporation.
    - h. Scofield, L. M. Company.
    - i. Solomon Colors.
  - 2. Color: As selected by Architect from manufacturer's full range.

- a. Provide one color in addition to natural color pavement, as indicated on the Drawings.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 3500 psi.
  - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 5 inches, plus or minus 1 inch.
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 6 percent plus or minus 1.5 percent for 3/4-inch nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Use water-reducing admixture, high-range water-reducing admixture, high-range water-reducing and retarding admixture or plasticizing and retarding admixture in concrete, as required, for placement and workability.
  - 1. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- G. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements for concrete exposed to deicing chemicals.



- H. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

### 3.2 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.

### 3.3 EDGE FORMS AND SCREED CONSTRUCTION

- A. 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.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

### 3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at isolation joints.
  - 1. Continue steel reinforcement across construction joints, unless otherwise indicated.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
  - 1. Locate expansion joints as shown on the Drawings.
  - 2. Extend joint fillers full width and depth of joint.
  - 3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface.
  - 4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  - 5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

### 3.6 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Screed pavement surfaces with a straightedge and strike off.
- I. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

- J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.
- L. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  2. Do not use frozen materials or materials containing ice or snow.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.7 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.

- B. 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.
  - 1. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.8 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. 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.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: 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.

### 3.9 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
1. Elevation: 1/4 inch.
  2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  3. Surface: Gap below 10-foot- long, unlevelled straightedge not to exceed 1/4 inch.
  4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
  5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
  6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
  7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
  8. Joint Spacing: 3 inches.
  9. Contraction Joint Depth: Plus 1/4 inch, no minus.
  10. Joint Width: Plus 1/8 inch, no minus.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least 1 composite sample for each 5000 sq. ft. or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  6. Compressive-Strength Tests: ASTM C 39; test 1 specimen at 7 days and 2 specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

**3.11 REPAIRS AND PROTECTION**

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 02751**



**SECTION 02764 - PAVEMENT JOINT SEALANTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Expansion and contraction joints within cement concrete pavement.
  - 2. Joints between cement concrete and asphalt pavement.
- B. Related Sections include the following:
  - 1. Division 2 Section "Cement Concrete Pavement" for constructing joints in concrete pavement.
  - 2. Division 7 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.

**1.3 SUBMITTALS**

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each type and color of joint sealant required. Install joint-sealant samples in 1/2-inch- wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- D. Qualification Data: For Installer and testing agency.
- E. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Notice to Proceed with the Work.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

**1.6 PROJECT CONDITIONS**

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - 2. When joint substrates are wet or covered with frost.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

**2.2 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
  - 1. Two colors will be required.

## 2.3 COLD-APPLIED JOINT SEALANTS

- A. Multicomponent Sealant for Concrete: Pourable, chemically curing elastomeric formulation complying with the following requirements for formulation and with ASTM C 920 for type, grade, class, and uses indicated:
  - 1. Urethane Formulation: Type M; Grade P; Class 25; Uses T, M, and, as applicable to joint substrates indicated, O.
    - a. Available Products:
      - 1) Pecora Corporation; Urexpan NR-300.
      - 2) Bostik Findley; Chem-Calk 550.
      - 3) Meadows, W. R., Inc.; POURTHANE.
      - 4) Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
      - 5) Pecora Corporation; Urexpan NR-200.

## 2.4 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

## 2.5 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of backer materials.
  2. Do not stretch, twist, puncture, or tear backer materials.
  3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses provided for each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
  2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

### **3.4 CLEANING**

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

### **3.5 PROTECTION**

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

**END OF SECTION 02764**

**SECTION 02780 - UNIT PAVERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Concrete pavers set in mortar setting beds.
- B. Related Sections include the following:
  - 1. Division 2 Section "Cement Concrete Pavement" for concrete base under unit pavers and for cast-in-place concrete curbs serving as edge restraint for unit pavers.
  - 2. Division 2 Section "Pavement Joint Sealants" for sealing control and expansion joints in unit pavers with elastomeric sealants.

**1.3 SUBMITTALS**

- A. Product Data: For materials other than water and aggregates.
- B. Product Data: For the following:
  - 1. Pavers.
  - 2. Mortar and grout materials.
- C. Manufacturer Qualifications: Submit a list of similar projects using the proposed paver which have been completed for a minimum of 10 years prior to bid date. List shall include the name of the Owner, project street address and the name and telephone number of the Architect.
- D. Samples for Initial Selection: For the following:
  - 1. Each type of unit paver indicated.
  - 2. Joint materials involving color selection.

- E. Samples for Verification:
  - 1. Full-size units of each type of unit paver indicated.
  - 2. Joint materials.
- F. Compatibility and Adhesion Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of unit paver, joint material, and setting material from one source with resources to provide materials and products of consistent quality in appearance and physical properties.
- B. Preconstruction Compatibility and Adhesion Testing: Submit to latex-additive manufacturer, for testing indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
  - 1. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be nonstaining to, installed pavers and other materials constituting paver installation.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquids in tightly closed containers protected from freezing.



## 1.6 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.
- B. Weather Limitations for Mortar and Grout:
  - 1. Cold-Weather Requirements: Protect unit paver work against freezing when ambient temperature is 40 deg F and falling. Heat materials to provide mortar and grout temperatures between 40 and 120 deg F. Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40 deg F, cover with weather-resistant membrane; below 25 deg F, cover with insulating blankets; below 20 deg F, provide enclosure and temporary heat to maintain temperature above 32 deg F.
  - 2. Hot-Weather Requirements: Protect unit paver work when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and higher.
    - a. When ambient temperature exceeds 100 deg F, or when wind velocity exceeds 8 mph and ambient temperature exceeds 90 deg F, set pavers within 1 minute of spreading setting-bed mortar.

## PART 2 - PRODUCTS

### 2.1 CONCRETE PAVERS

- A. Concrete Pavers: Solid paving units, made from normal-weight concrete with a compressive strength not less than 5000 psi, water absorption not more than 5 percent according to ASTM C 140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
  - 1. Products: Subject to compliance with requirements, provide concrete pavers manufactured by a company that has been in the business of manufacturing similar pavers with a record of successful performance in similar applications for a period of 10 years minimum.
  - 2. Thickness: 2-3/8 inches.
  - 3. Face Size and Shape: 12 inches square.
  - 4. Color: As selected by Architect from manufacturer's full range.

**2.2 ACCESSORIES**

- A. Compressible Foam Filler: Preformed strips complying with ASTM D 1056, Grade 2A1.

**2.3 MORTAR SETTING-BED MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or II.
- B. Sand: ASTM C 144.
- C. Latex Additive: Manufacturer's standard acrylic-resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
  - 1. Manufacturer: Subject to compliance with requirements, provide latex additive by one of the following:
    - a. Boiardi Products Corporation.
    - b. Bonsal, W. R. Company.
    - c. Bostik Findley Inc.
    - d. C-Cure.
    - e. Custom Building Products.
    - f. DAP Inc.
    - g. Jamo Inc.
    - h. Laticrete International, Inc.
    - i. MAPEI Corp.
    - j. SGM.
    - k. Summitville Tiles, Inc.
    - l. TEC Incorporated; H. B. Fuller Company.
- D. Water: Potable.

**2.4 GROUT MATERIALS**

- A. Polymer-Modified Grout: ANSI A118.7, sanded grout; in color indicated.
  - 1. Manufacturer: Subject to compliance with requirements, provide polymer-modified grout by one of the following:
    - a. Boiardi Products Corporation.
    - b. Bonsal, W. R. Company.
    - c. Bostik Findley Inc.
    - d. C-Cure.
    - e. Custom Building Products.

- f. DAP Inc.
  - g. Jamo Inc.
  - h. Laticrete International, Inc.
  - i. MAPEI Corp.
  - j. SGM.
  - k. Summitville Tiles, Inc.
  - l. TEC Incorporated; H. B. Fuller Company.
2. Product Type: Either dry mix, containing ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or two-component mix, containing acrylic resin or styrene-butadiene rubber in liquid-latex form and prepackaged dry-grout mix complying with ANSI A118.6 and recommended by latex-additive manufacturer.
- B. Grout Colors: As selected by Architect from manufacturer's full range.
- C. Water: Potable.

## 2.5 MORTAR AND GROUT MIXES

- A. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing times, and other procedures needed to produce setting-bed and joint materials of uniform quality and with optimum performance characteristics. Discard mortars and grout if they have reached their initial set before being used.
- B. Mortar-Bed Bond Coat: Mix neat cement or cement and sand with latex additive to a creamy consistency.
- C. Portland Cement-Lime Setting-Bed Mortar: Type M complying with ASTM C 270, Proportion Specification.
- D. Latex-Modified, Portland Cement Slurry Bond Coat: Proportion and mix portland cement, sand, and latex additive for slurry bond coat to comply with written instructions of latex-additive manufacturer.
- E. Packaged, Polymer-Modified Grout Mix: Proportion and mix grout ingredients according to grout manufacturer's written instructions.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
- B. Clean concrete substrates to remove dirt, dust, debris, and loose particles.

**3.3 INSTALLATION, GENERAL**

- A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible in finished work.
- B. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- C. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
- D. Joint Pattern: As indicated.
- E. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.
- F. Expansion and Control Joints: Provide joint filler at locations and of widths matching those in adjacent concrete paving. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.

### 3.4 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing setting bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch thickness for bond coat.
- C. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.
- D. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Cuts back, bevel edge, remove, and discard setting-bed material that has reached initial set before placing pavers.
- E. Place pavers before initial set of cement occurs. Immediately before placing pavers on setting bed, apply uniform 1/16-inch- thick, slurry bond coat to bed or to back of each paver with a flat trowel.
- F. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- G. Spaced Joint Widths: Provide 3/8-inch nominal joint width with variations not exceeding plus or minus 1/16 inch.
- H. Grout joints as soon as possible after initial set of setting bed.
  - 1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
  - 2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
  - 3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
  - 4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.
- I. Cure grout by maintaining in a damp condition for seven days, unless otherwise recommended by grout or liquid-latex manufacturer.

**3.5 REPAIRING, POINTING, AND CLEANING**

- A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point up joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.
- C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
  - 1. Remove temporary protective coating from brick pavers as recommended by protective coating manufacturer and as acceptable to unit paver and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

**END OF SECTION 02780**

**SECTION 03300 – CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

**1.2 DESCRIPTION**

- A. Under this Section, furnish all material, labor, equipment and services required to complete the Cast-In-Place Concrete Work as shown on the drawings and/or specified.
  - 1. Colored cast-in-place concrete exposed to view in completed structure.
  - 2. Natural colored concrete when concealed from view.
- B. Related Sections include the following:
  - 1. Division 2 Section "Cement Concrete Pavement" for site concrete.
  - 2. Division 3 Section "Precast Concrete" for structural and architectural precast concrete.
  - 3. Division 9 Section "Water Repellent and Graffiti Resistant Coatings" for coatings to be applied to exposed, unpainted cast-in-place concrete.
  - 4. Division 9 Section "Paint" for stains and stain sealers to be applied to exposed, unpainted cast-in-place concrete.
- C. Items installed under this Section but furnished by others:
  - 1. Forms for dimensional letters to be embedded in concrete. Letters will be installed by others.

**1.3 QUALITY ASSURANCE**

- A. A competent Engineer or Foreman, familiar with the class of work and approved by the Architect shall be employed by the Contractor to superintend the placing of all forms and reinforcement, and concrete in all parts of the work included under this heading.
- B. Comply with the following codes and provisions:
  - 1. ACI 301 "Specifications for Structural Concrete for Buildings".

2. ACI 318 "Building Code Requirements for Reinforced Concrete".
3. ASTM C33, Standard Specification for Concrete Aggregates.
4. ASTM C39, Standard Test Method for compressive Strength of Cylindrical Specimens.
5. ASTM C94, Standard Specification for Ready-Mixed Concrete.
6. ASTM C138, Standard Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
7. ASTM C143, Standard Test Method for Slump of Portland Cement Concrete.
8. ASTM C150, Standard Specification for Portland Cement.
9. ASTM C171, Standard Specification for Sheet Materials for Curing Concrete.
10. ASTM C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
12. ASTM C260, Standard Specification for Air-Entraining Admixtures for Concrete.
13. ASTM C494, Standard Specification for Chemical Admixtures for Concrete.
14. ASTM C309, Specification for Liquid Membrane Forming Compounds for Curing Concrete.

#### 1.4 SUBMITTALS

- A. The contractor shall submit shop drawings in accordance with the General Conditions and Supplementary General Conditions to the Architect for approval before fabrication. Shop drawings shall be prepared immediately on award of contract and shall be promptly submitted for approval.
- B. Shop drawings shall be in accordance with these contract drawings and in general shall be detailed per the "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315). The drawings shall show the placing of all bars with appropriate plans, dimensions, sections, details, and required accessories and support bars.
- C. Test Reports shall be sent directly to the Architect in triplicate.
- D. Certified mill test reports shall be sent directly to the Architect in triplicate.
- E. Concrete Mix Designs per ACI 318-95, Section 5.3.
- F. Sample of colored concrete, if applicable.

#### 1.5 JOB CONDITIONS ENVIRONMENTAL

- A. Cold Weather:



1. During cold weather, protection and curing shall comply with "Recommended Practice for Winter Concreting" (ACI 306).
2. Concrete shall be maintained at 50 degrees F. for the full length of time required for protection. Consideration shall be given to the natural heat of hydration of concrete for the first three days after pouring and external heat shall be taken daily during the protected period by placing thermometers on concrete surface under the insulating blankets.
3. Minimum length of concrete protection at 50 degrees F.
  - a. Formed floor construction - seven days
  - b. Footings and foundations below grade - two days
  - c. All other concrete - five days.
4. When the average daily temperature at the job site falls generally below 40 degrees F. the following procedure should be followed:
  - a. Minimum temperature of fresh concrete as mixed at the plant:
    - 1) 60 degrees F.: outside temperature above 30 degrees F.
    - 2) 65 degrees F.: outside temperature 0 to 30 degrees F.
    - 3) 70 degrees F.: outside temperature below to 0 degrees F.
5. Concrete as placed to be at 50 degrees F. to 60 degrees F. Concrete temperatures above 80 degrees F. will not be acceptable.
6. Proper procedures for placement and finishing concrete shall be used to expedite initial setting of concrete. The use of calcium chloride to accelerate initial concrete set will not be permitted. Approved water reducing additives are recommended to reduce slump, and minimize bleed water, which can delay finishing after flatwork.
7. Form temperature shall be raised to a minimum of 50 degrees F. thru the application of artificial heat with approved methods before placement of concrete.
8. Arrangements for heating, covering or housing newly placed concrete should be made in advance of placement and should be adequate to maintain the curing temperatures noted herein.
9. Slabs shall be covered for the length of the protected period with a two-inch thickness of commercial insulating blanket or equivalent approved coverage. Vertically formed surfaces e.g. columns and walls should be protected with a 2" insulating blanket on all sides.
10. After removal of protection, the maximum allowable drop in concrete temperature shall be 40 degrees F. in 24 hours.
11. Additional precautions for slabs on grade:
  - a. Provide enclosure with heat to raise subgrade temperature to minimum 40 degrees F.
  - b. Maintain enclosure temperature as required to provide 50 degrees F. concrete temperature for required protected period.

## B. Hot Weather:

1. During hot weather, protection and curing shall comply with "Recommended Practice for Hot Weather Concreting" (ACI 305).
2. Forms and reinforcing steel are to be cooled by fogging prior to placing concrete. Fogging nozzle should produce fog blanket and not an excessive washing spray.
3. Maximum temperature of concrete as placed should be less than 90 degrees F. The use of cold mixing water, cement at temperature less than 70 degrees F. and of cooled aggregate are recommended to reduce concrete temperature.
4. Approved retarding admixtures and water reducers are recommended to retard setting time and minimize water requirements.
5. Mixing and delivery times should be minimized, and concrete placement, consolidation and finishing should be done at the fastest possible rate in coordination with delivery.
6. For slabs on grade the subgrade should be moistened with a fogging spray but should be free of standing water and soft spots at the time of concreting.
7. Curing water should not be much cooler than the concrete and alternate cycles of wetting and drying should be avoided.
8. During conditions of low humidity and moderate wind, special care should be taken to keep concrete flatwork moist for the prescribed period of time.

## C. Protection

1. In general, protection and curing shall comply with "Specifications for Structural Concrete for Buildings" (ACI-301).
2. Curing operations shall start as soon as possible without marring the surface after screeding and finishing.
3. During the curing period, concrete shall be protected from damage by action of wind, rain, flowing water and from damaging mechanical disturbances such as load stress, heavy shock and excessive vibration. All finished concrete surfaces shall be protected from damage by construction equipment, materials or defacement of any nature during the construction period.
4. Concrete shall be protected from premature drying and shall be covered with burlap or any approved waterproof paper conforming to ASTM C171 and sprayed as frequently as conditions require to maintain moisture in the concrete for at least seven days after placement. In lieu of the above, the contractor may apply an approved curing compound conforming to "Specifications for Liquid Membrane Forming Compounds for Curing Concrete" (ASTM C-309). The compound shall be applied in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. If the liquid membrane is used, the ponding or sprinkling of the concrete surface may be terminated after one day.

Should have tint for ease in getting uniform coverage. Curing compound must not be used where subsequent bonding or staining is required.  
Approval of the above product to be used as a Liquid Membrane Forming Compound for Curing Concrete must be obtained, in writing, from the Subcontractor (s) and manufacturer' (s) for flooring materials.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. ASTM Standards: Reference to ASTM Standard Specifications in the following shall be assumed to refer to the latest revision in all cases.
- B. Portland Cement: ASTM C-150 type 1. For all concrete the brand of cement shall be approved by the Architect and this one brand shall be used thru out the work. Air entrained cement will not be permitted. Certified mill test reports of the chemical and physical properties of all cement used in work shall be submitted to the Architect for approval.
- C. Coarse Aggregate: Clean, hard, durable, uncoated crushed limestone or gravel conforming to ASTM C 33. Use size `57' (1") or `67'(3/4") thru-out.
- D. Fine aggregate shall be clean, hard, durable uncoated grains conforming to ASTM C-33. Sand for exposed concrete shall be Meramec River or other approved lignite free sand.
- E. Fly Ash (for use when cast-in-place concrete will not be exposed to view in completed structure): Produced from lignite or subbituminous coal conforming to ASTM C-618, Class C.
- F. Mixing Water: Shall be clean and free from all oil, acid, and injurious amounts of vegetable matter, alkalis, salts, or other detrimental impurities.
- G. Color Pigment (for use in areas noted on the Drawings): ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
  - 1. Manufacturers:
    - a. Bayer Corporation.
    - b. ChemMasters.
    - c. Conspec Marketing & Manufacturing Co., Inc.; a Dayton Superior Company.
    - d. Davis Colors.
    - e. Elementis Pigments, Inc.
    - f. Hoover Color Corporation.
    - g. Lambert Corporation.

- h. Scofield, L. M. Company.
    - i. Solomon Colors.
  - 2. Color: Match existing concrete color in similar location.
- H. Air-entraining Admixture: Conform to ASTM C260 Standard "Specifications for Air-Entraining Admixtures for Concrete".
  - 1. Approved Products:
    - a. Darex AEA by Grace Construction Products.
    - b. MB AE 90 by Master Builders Technologies
    - c. Any approved equivalent product
- I. Water Reducing Admixtures: Conform to ASTM C494, Type A, "Specification for Chemical Admixtures for Concrete".
  - 1. Approved Products:
    - a. Daracem by Grace Construction Products
    - b. Pozzolith by Master Builders Technologies
    - c. Any approved equivalent product.
- J. Accelerating or Retarding Admixtures: May be used only with specific approval of Structural Engineer.
- K. Reinforcing Steel: Shall be deformed bars conforming to ASTM 615 (grade 60). Mill Test reports in triplicate shall be furnished to the Architect for each 10 tons furnished.
- L. Welded Wire Fabric: Shall comply with ASTM 185 with size as shown on drawings.
- M. Metal reinforcement Accessories: Conform to C.R.S.I. requirements for accurate placement of accessories. Accessories in contact with formwork shall be hot-dipped galvanized or plastic coated, after fabrication, with legs turned up for exposed surfaces only.
- N. Fiber Reinforcing: Strux 90/40 fiber by Grace Construction Products.
- O. Vapor Barrier: 6 mil natural polyethylene film where called out on drawings and under interior floor slabs.
- P. Curing-Sealing Compound: Conform to ASTM C-309, Type 1. Submit specific brand for architect's approval.
- Q. Isolation Joint and Expansion Joint Materials: Conforming to ASTM D-1751. Preformed, non-extruding, resilient bituminous type.

- R. Waterstops: Shall be a cube shaped, flexible strip of bentonite impregnated material, minimum 1/2 inch thick. Volclay Waterstop RX by American Colloid Company or equal.
- S. Non-shrink Grout: Factory, pre-mixed. Metallic or non-metallic subject to architects approval.
- T. Concrete Formwork: Conform to ACI 347, latest version.
- U. Form ties at Exposed Surfaces: Removable or snap-off ties. Removable ties shall be coated with lacquer or similar material to facilitate removal, pulled from unexposed side. Wire ties will not be permitted.
- V. Penetrating Sealer:
1. Penetrating sealer for areas indicated on drawings to receive sealer: The sealer shall be a single component, colorless liquid, water repellent, chemically resistant, blend of silane and/or siloxane resins. It shall be applied to provide the following:
    - a. Chloride screen (NCHRP 244 series II): 90% effective
    - b. Water absorption (ASTM C-67 & C-140) 2%, repellency 98%
    - c. Penetration after 1 application: 1/8" minimum
    - d. Scaling resistance (ASTM C-672): 0
    - e. Sealer must be applied according to the manufacturers recommendations in order to achieve the above.
  2. Approved Products:
    - a. Dry Sil 40: Dow Corning
    - b. Sikagard 70: Sika Corp.
    - c. Consolideck SX: Pro So Co, Inc.
    - d. Euco-Guard: Euclid Co.
    - e. Pentane: L&M Inc.
    - f. Temproof TBS 964: Tremco
    - g. Stifel S: Noxcrete
  3. Any equivalent product must receive approval before being considered for use.
- W. Concrete Mixes - 28 day strengths (Normal weight)
- |    |           |                          |              |
|----|-----------|--------------------------|--------------|
| 1. | 3500 psi: | 5-1/2 sack/yard minimum  | w/c=0.45 MAX |
| 2. | 4000 psi: | 5-1/2 sack /yard minimum | w/c=0.45 MAX |
| 3. | 5000 psi: | 6-1/2 sack/yard minimum  | w/c=0.45 MAX |

- X. All concrete shall have a plasticizing admixture in accordance with manufacturer's recommendation with only enough water added to the mix to produce a concrete with the lowest slump compatible with proper placing. At Contractor's option the plasticizing admixture may be omitted for non-exposed foundation work.
- Y. An approved superplasticizer may be added to flatwork concrete at the jobsite only, according to the manufacturer's recommendations and with specific approval of the engineer. ASTM C494 Type F or G.
- Z. All exterior exposed concrete shall be air-entrained with 6% air content.
- AA. In general the proportion of ingredients shall be such as to produce a mixture which will readily work into corners and angles of the forms and around reinforcement by the methods of placing and consolidating employed on the work, but without permitting the materials to segregate or excessive free water to collect on the surface. Any concrete that is to be pumped shall be proportioned specifically for that purpose.
- BB. The permissible slump may vary between 2 and 4 inches prior to addition of plasticizer.
- CC. Water shall not be added to the concrete after initial plant mix has been executed unless said addition of water is approved by the Architect.
- DD. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions.
  - 1. See the Drawings for the extent of each colored pigment required.

## **2.2 FABRICATION OF REINFORCING STEEL**

- A. Reinforcing steel shall be fabricated and placed in accordance with the applicable provisions of the ACI 315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures: and the C.R.S.I. "Specifications and Recommended Practice for Placing Reinforcing Steel", latest Edition.

## **PART 3 - EXECUTION**

### **3.1 ERECTION OF FORMS**

- A. In general the construction of forms shall be in accordance with "Recommended Practice for Concrete Formwork" (ACI 347).

- B. Construct forms to lines, shapes and dimensions indicated on the drawings. They shall be plumb, straight, properly aligned and sufficiently tight to prevent leakage. Take all possible care in the formwork to produce surfaces free from projections, indentations, and other defects.
- C. Tolerances for formed surfaces shall be within limits set by the noted standards which include but are not limited to the following.
  - 1. Variation from plumbness for wall and columns:
    - a. in any 10 feet of height - 1/4"
    - b. maximum in entire height - 1"
  - 2. Variation from the level or from elevations specified in the contract documents slab and beam soffit forms:
    - a. in any 10 ft. of length - 1/4"
    - b. in any bay or 20 ft. of length - 3/8"
    - c. maximum entire length - 3/4"
- D. Provide access openings to clean and inspect forms and reinforcing prior to depositing concrete.
- E. The design and engineering of the formwork, as well as its construction shall be the responsibility of the contractor and shall be designed, erected, supported, braced and maintained so that it will safely support all vertical and lateral loads that may be applied until such loads can be supported by the concrete structure.
- F. Foundations for formwork shall be provided with proper support on ground or mudsills without appreciable settlement it should be stabilized by adequate means. Mudsills should never be placed on frozen ground.
- G. Ties for forms shall be adjustable in length to permit tightening of forms. Locate ties level and plumb in horizontal rows and vertical tiers.
- H. Chamfer corner strips shall be placed at all exposed external corners. All exposed external column corners shall be chamfered.
- I. Before placing reinforcing, coat all contact surfaces and forms and form liners with a non-staining concrete releasing agent which will not injure concrete surface when forms are removed. Do not coat forms at concrete surface to be plastered.

### 3.2 REINFORCING

- A. All reinforcing shall have fabricating and placing tolerances in accordance with "Specification for Structural Concrete for Buildings" (ACI-301).

- B. Bars may be moved as necessary to avoid interference with other reinforcing steel, conduits, or embedded items. If bars are moved more than one bar diameter, or enough to exceed the allowed tolerances, the resulting arrangement of bars shall be subject to approval.
- C. Reinforcing shall be supported and wired together at intersections so that it will be secured and accurately held in place to prevent displacement at construction loads of placement of concrete. Particular care shall be exercised to maintain proper concrete coverage in surfaces to remain exposed to view. At these exposed surfaces the contractor is to furnish noncorrosive accessories for support of bars.
- D. Bottom reinforcing in footings and slabs on grade shall be supported on precast concrete blocks of proper depth with embedded wires to secure reinforcing in place. See structural drawings for required clearances.
- E. All reinforcement, at the time concrete is placed shall be free of mud, oil or other material that may adversely affect or reduce the bond.
- F. Unless permitted by the Architect, reinforcement shall not be bent after being embedded in hardened concrete.
- G. All reinforcement shall be securely fastened in forms and approved by the Architect before the concrete is placed.

### 3.3 MIXING AND TRANSPORTING

- A. All concrete thru out shall be batched, plant mixed and transported in accordance with "Specifications for Ready-Mixed Concrete" (ASTM C94).
- B. A sufficient number of trucks shall be provided to continually carry on the work.
- C. In general, only one type of concrete shall be poured at a time. Trucks shall be prominently marked in an approved manner to be readily recognized by workman on the job for each type of concrete being used on this project.
- D. All drivers of trucks conveying ready-mixed concrete shall furnish duplicate delivery tickets with each load of concrete. These tickets shall indicate type of concrete and date and time dispatched from mixing plant. Concrete from trucks bearing tickets with an elapsed time in excess of one hour, will be rejected for use on this job.
- E. Concrete which has partially hardened or has been contaminated by foreign material shall not be deposited.



### 3.4 PLACING

- A. In general concrete shall be placed in accordance with "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete (ACI-304) and "Standard Specifications for Structural Concrete for Buildings (ACI-301).
- B. Before beginning a pour of concrete, all mixing and conveying equipment must be thoroughly cleaned, all debris and foreign matter removed from the forms, the forms wetted, and reinforcing secured and approval of the Architect obtained.
- C. Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients and in a manner which will assure that the required quality of the concrete is maintained.
- D. Concrete shall be deposited continuously, or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the concrete. Concrete should be placed in horizontal layers, avoiding inclined layers and cold joints.
- E. On sloping surfaces concrete should be placed at the lower end of the slope first.
- F. Equipment should be arranged so that the concrete has an unrestricted vertical drop into the center of the placement receiving it. The stream of concrete should not be separated by permitting it to fall freely over reinforcement. If forms are sufficiently open and clear so that concrete is not disturbed in a vertical fall into place, direct discharge without use of hoppers or chutes is acceptable.
- G. Before placing concrete on or against concrete which has already set, the surface of the concrete shall be thoroughly cleaned of all laitance and loose materials and roughened.
- H. Place forms for dimensional characters in slab as soon as practical. Ensure that entire character face will be flush with slab surface upon completion of finishing operation.
- I. Concrete shall be vibrated by the use of "Spud" type vibrators with flexible shafts and shall be operated by competent workmen. The largest and most powerful vibrator that can be effectively operated in the given work should be used for best results.

- J. Vibration shall begin as soon as one batch of concrete has been placed and shall proceed continuously until the entire section being poured is completely vibrated. Use of vibrators to transport concrete within forms shall not be allowed.
- K. Insert vibrators in a vertical position at 18" intervals to bottom of pour. Where concrete is placed in layers, extend vibrator into previous pour if still in a plastic state.
- L. At each insertion, the duration shall be sufficient to consolidate the concrete but not sufficient to cause segregation; generally 5 to 15 seconds in one spot is considered sufficient.
- M. On exposed vertical surfaces where air void holes are objectionable, extra vibration may be used to minimize these voids but a mix with less water might be required to prevent segregation. A full surface of mortar shall be brought against the form by the vibration process, supplement if necessary by spading to work the coarse aggregate back from the formed surface.
- N. The hardened concrete at construction joints between footings and walls or between columns or walls and floor construction and joints in unexposed walls shall be dampened, (but not saturated) immediately prior to placing of fresh concrete.
- O. The hardened concrete of joints in exposed work, joints to be water tight, and construction joints in formed floor construction shall be dampened (but not saturated) and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. This grout should be scrubbed into the surface of the joint with wire brooms and shall be approximately 1/2" high on surfaces. The fresh concrete shall be placed before the grout has attained its initial set.

### 3.5 FINISHING

- A. Floors shall be screeded off accurately and full up to screeds, then given a float finish. When the concrete has reached the proper consistency it shall be troweled to a smooth, even, hard, dense surface. Cement shall not be used to absorb surface moisture.
  - 1. Floors scheduled to be sealed with film-forming sealers shall have a slight texture imparted which will produce a slip resistant floor when sealed.
- B. Walls indicated or scheduled to have cement (exposed) rubbed finish or painted finish shall be smoothed finished as follows:

1. Immediately after removing the forms the ties are to be snapped off and recesses filled with cement and sand mortar and finished smooth to match adjoining wall.
  2. Any ragged or irregular places in the concrete face shall be worked off to a true and uniform surface. Any voids wider or deeper than 1/8" shall be filled. The exposed surface to be rubbed smooth with carborundum stone and water immediately after the forms are removed.
- C. Rubbed Finish: Provide grout cleaned finish to scheduled concrete surfaces which have received smooth finish treatment.
1. Combine one part Portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard Portland cement and white Portland cement, amounts determined by trial patches, so that final color of dry grout will match adjacent surfaces.
  2. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.6 PATCHING

- A. All other concrete surfaces shall have form tie holes, any voids wider than 1/2" and deeper than 1/4" patched with cement and sand mortar.

### 3.7 CURING

- A. All interior concrete slabs shall be cured with curing compound (unless otherwise noted) as soon as slab finish has set sufficiently hard to permit application.

### 3.8 FLOOR SLABS ON GRADE

- A. Slabs, in general, shall be placed in accordance with ACI 302, "Recommended Practice for Concrete Floor and Slab Construction".
- B. Welded wire fabric shall be located 1 inch from top of slab and shall be 6 x 6 - W1.4 x W1.4 flat sheets unless otherwise indicated.

- C. Welded wire fabric shall be supported on metal chairs, or precast concrete blocks 36 inches on center, each way, and lapped 1'-0 at ends and sides.
- D. Place vapor barrier under all floor slabs on grades and lap all edges 6 inches.
- E. Clean sand shall be tamped into voids of surface of sub-base, before vapor barrier is installed, to prevent puncturing of membrane by aggregate.
- F. Provide control joints on centers of columns in both directions, but not greater than 15 feet on center in each direction, unless otherwise indicated.
- G. Diamond shaped isolation joints shall be provided around all columns, using 1/4 inch thick by full slab depth preformed joint filler.
- H. Provide isolation joints around perimeter where concrete slab abuts vertical wall, using 1/4 inch thick preformed joint filler.
- I. Control joints shall be an approved plastic tee with depth approx. one-third the slab thickness. Top flange of tee shall be removed prior to finishing the concrete. W.W.F. to run continuously across joints with alternate wires being cut at joint.
- J. Construction joints are to be built at control joints and are to be formed with a tongue and groove metal screed joint with dowels.

### 3.9 WATERSTOPS

- A. Set waterstops at joints of removable knock out panels occurring in concrete walls.
- B. Set waterstops at all vertical construction joints and expansion joints in concrete basement walls below grade, at juncture of concrete retaining walls and the building and at horizontal construction joints in basement walls at juncture of wall and footing.
- C. Waterstops shall be continuous at all joints with ends butted. Install per recommendations of manufacturer. Approved manufacturer is Volclay Waterstop RX by American Colloid Co.

### 3.10 CONSTRUCTION JOINTS

- A. Joints in walls and columns shall be at the underside of slabs, joists or beams and at the tops of footings or floor slabs.
- B. Joints shall be perpendicular to the main reinforcement. All reinforcement and welded wire fabric is to run continuously thru the construction joint.

- C. Longitudinal keys at least 1-1/2" deep shall be provided in all joints in walls. Waterstops in exterior walls shall be provided as indicated in this specification.
- D. Construction joints are to be located so as to allow a continuous monolith placement of concrete between joints in one operation.

### **3.11 INSERTS, FASTENING DEVICES, SLOTS, HOLES AND SLEEVES FOR OTHER WORK**

- A. Install inserts, metal ties, anchors, bolts and other fastening devices occurring in concrete for attachment of other work. Properly locate in cooperation with other trades and secure accurately in position before concrete is poured.
- B. All inserts shall be set flush with surface, perfectly aligned and kept free of concrete. Provide all slots, holes and sleeves for pipes where shown or required and if not shown on plans, obtain size and location from other sub-contractors before pouring concrete work.
- C. The concrete covering of the pipes and fittings shall not be less than 1-1/2" for concrete surfaces exposed to the weather or in contact with the ground nor 3/4" for all other pipes and sleeves. Pipes or conduits of aluminum shall not be embedded in structural concrete unless coated or covered to prevent electrolytic action.

### **3.12 REMOVAL OF FORMS**

- A. Remove forms in such a manner as to insure complete safety of the structure. In no case shall supporting forms be removed until members have acquired sufficient strength to safely support their weight and such additional loads as may come upon them.
- B. Time of removal of forms will be determined by weather and other conditions prevailing at the time. It should be understood that the contractor shall be responsible for the safety and security of his work. In general the following may be used as a guide for removal of forms under optimum conditions.
- C. Forms for vertical form surfaces may be removed a minimum of 48 hours after concrete pour.

### **3.13 FIELD QUALITY CONTROL**

- A. The Owner shall engage and pay a qualified independent testing laboratory to provide services pertaining to control and testing for all concrete used on this project.
- B. Test aggregates proposed to be used to verify compliance with specified requirements.

- C. Verify preparation of mix design for each type of concrete specified.
- D. Make and test proof cylinders for each type of concrete to verify design mix; proof cylinders conform to ACI 318-89 Table 5.3.2.2 for 28-day strength or 56-day strength.
- E. Verify use of approved additives in proportions specified or as recommended by the manufacturer.
- F. Slump tests shall be made not less than twice during each days placing.
- G. Cylinder tests shall be made for each 100 cu. yds. of concrete, nor less than once for each 5000 sq. feet of surface area for floors and walls, but not less than one test for each days pour.
- H. A cylinder test for 28 day strength concrete shall consist of the following:
  - 1. Three cylinders of each test shall be laboratory cured and tested one at seven days and two at twenty-eight days.
  - 2. One cylinder of each test shall be field cured under the same conditions as concrete incorporated into the project and laboratory tested at seven days.
  - 3. Additional cylinders are to be incorporated into each test as required by the contractor for early removal of forms or post- tensioning.
- I. A cylinder test for 56 day strength concrete shall consist of the following:
  - 1. Four cylinders of each test shall be laboratory cured and tested, one at seven days, one at twenty-eight days, and two at fifty-six days.
  - 2. Two cylinders of each test shall be field cured under the same conditions as concrete incorporated into the project and laboratory tested, one at seven days and one at twenty-eight days.
  - 3. Additional cylinders are to be incorporated into each test as required by the contractor for early removal of forms or post-tensioning.
- J. Test procedures shall conform to:
  - 1. Sampling Fresh Concrete: ASTM C172
  - 2. Slump: ASTM C143
  - 3. Air Content: ASTM C173 or C231
  - 4. Unit Weight for lightweight concrete: ASTM C567
  - 5. Compression Test Specimen: ASTM C31
  - 6. Compressive Strength Tests: ASTM C39

K. Additional Tests:

1. The testing service will make additional tests of in-place concrete when test results indicate specified strengths and other characteristics have not been met. As directed by the Architect, cored cylinders complying with ASTM C42, along with any other tests as necessary, will be paid for by the contractor.

**END OF SECTION 03300**

**SECTION 03365 - CONCRETE FLOOR STAIN****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes stains and sealers applied to concrete floor slabs.

**1.3 RELATED SECTIONS**

- A. Section 03300 – “Cast-in-Place Concrete” for requirements for concrete slabs, finishing slabs and sealers to be applied to unstained concrete floors.

**1.4 SUBMITTALS**

- A. Comply with Section 01330 - Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including surface preparation, application and sealing instructions.
- C. Samples for Initial Selection: Submit manufacturer's color chart illustrating the full range of stain colors available.
- D. Manufacturer's Qualifications: Submit list of successfully completed projects which have been in place for a minimum of 5 years, including project name and location, name of architect, and type and quantity of concrete floor stain and sealer applied.
- E. Installer's Project References: Submit list of not less than 6 successfully completed projects, including project name and location, name of architect, and type and quantity of concrete floor stain and sealer applied.
- F. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.



## 1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Concrete floor stain and sealer materials shall be products of a single manufacturer.
- B. Manufacturer's Qualifications: Manufacturer shall have continuously produced stains and sealers identical to the products to be used for a period of at least 10 years.
- C. Installer's Qualifications:
  - 1. Successful experience in application of similar concrete floor stains.
  - 2. Employ persons trained for application of concrete floor stains.
- D. Mockup: Construct a concrete slab with an area of at least 20 square feet separate from the building and plaza slabs and which will be used to develop the final stain color and pattern to be applied to areas scheduled to be stained. Use products, concrete mix and curing methods identical to those used for the floors to be stained.
  - 1. Mockup shall remain undisturbed until the end of construction.
  - 2. Demolish mockup at the end of construction, remove debris from the site and legally dispose of off site.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer, product name, and concrete floor stain color.
- B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use.
  - 1. Concrete Floor Sealer: Keep away from ignition sources. Do not allow to freeze.
- C. Handling: Protect materials during handling and application to prevent damage or contamination.

## 1.7 PREINSTALLATION MEETING

- A. Convene a preinstallation meeting before start of application of concrete floor stain. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and applicator. Review surface preparation, application, protection, and coordination with other work.

**1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Apply floor stain and sealer only under conditions recommended by the stain manufacturer in their published instructions.

**1.9 SEQUENCING**

- A. Prepare surface and apply concrete floor stain after other interior finish work is completed.

**PART 2 - PRODUCTS****2.1 MANUFACTURER**

- A. Basis-of-Design: This specification is based upon LITHOCROME Tintura Stain and Selectseal-W sealer as manufactured by the L. M. Scofield Co. Subject to requirements, similar products manufactured by major manufacturers may be considered equivalent. Submit requests for consideration as specified in Division 1 requirements prior to the receipt of bids. Acceptance will be in the form of an addendum.

**2.2 CONCRETE FLOOR STAIN**

- A. Description: A penetrating, reactive stain that chemically combines with cured concrete to produce permanent translucent color effects.
  - 1. Color: As selected by the Architect from the manufacturer's full range of colors.
    - a. For the purposes of bidding, assume that there will be 3 colors required and that they will be mixed to form the final color and pattern.

**2.3 CONCRETE FLOOR SEALER**

- A. Description: A premium-quality, one-component, clear, acrylic-polyurethane sealer resistant to staining, abrasion and ultraviolet (UV) radiation that is formulated to protect stained concrete floors. Sealer shall produce a highly durable finish with a slip-resistant semigloss finish.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine surfaces to receive concrete floor stain. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

**3.2 SURFACE PREPARATION**

- A. Protection: Protect surfaces adjacent to area to be stained as recommended by the stain manufacturer.
  - 1. Protect walls and surrounding surfaces not to receive concrete floor stain.
  - 2. Do not allow stain to come in contact with wood or metal surfaces.
- B. Prepare concrete surface in accordance with manufacturer's instructions.
- C. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.

**3.3 APPLICATION**

- A. Apply concrete floor stain in accordance with manufacturer's instructions at locations indicated on the drawings.
  - 1. For bidding purposes, assume that two applications of stain will be required to achieve the approved color and pattern.
- B. Concrete Floor Sealer: Apply concrete floor sealer over concrete floor stain in accordance with manufacturer's instructions.
  - 1. For the purposes of bidding, assume that two coats will be required.

**3.4 PROTECTION**

- A. Protect stained concrete floor from damage during construction.
- B. Protect concrete surfaces from foot traffic for a minimum of 24 hours, or longer as recommended by the manufacturer.

END OF SECTION 03365

**SECTION 03460 - PRECAST CONCRETE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications, latest editions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This section includes the performance criteria, materials, production, and erection of precast and precast, prestressed concrete for the entire project. The work performed under this section includes all labor, material, equipment, related services, and supervision required for the manufacture and erection of the precast and precast, prestressed concrete work shown on the Contract Drawings, including the following:
  - 1. Hollow-core slab units.
  - 2. Beams and Columns.
  - 3. Walls.
  - 4. Insulated, precast concrete units.
  - 5. Precast service counter top.
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for placing connection anchors in concrete.
  - 2. Division 7 Section "Water Repellent and Graffiti Resistant Coatings " for water-repellent and graffiti resistant finish treatments to be applied to precast concrete surfaces.
  - 3. Division 7 Section "Joint Sealants" for elastomeric joint sealants and sealant backings between slab edges at exposed underside roof members and perimeter of other precast members.
  - 4. Division 9 Section "Paint" for field-applied coatings to be applied to precast concrete members.
  - 5. Division 16 Sections for electrical items to be embedded in precast wall panels and columns.

### 1.3 DEFINITIONS

- A. Reference Sample: Sample of approved precast concrete color, finish and texture, preapproved by Architect.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated on drawings.
- B. Thermal Movements: Provide for thermal movements noted:
  - 1. The precast system design shall consider the maximum seasonal climatic temperature change based on the latest edition of PCI MNL 120.
  - 2. In-plane movements thermal movements of individual members directly exposed to the sun shall consider a temperature range
    - a. 120-degrees F. ambient.
    - b. 180-degrees F on member surface.
  - 3. Member and connection design shall consider through thickness thermal gradients as appropriate.
- C. Fire-Resistance Ratings: Provide precast concrete roof and wall panel units with the following fire-resistance ratings:
  - 1. Hollow-Core Precast Slab Roof Units: 1-1/2-hours without topping.
  - 2. Insulated Precast Wall Units: Three hours.

### 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for 5 years or period of warranty, whichever is greater.
- B. Design Mixes: For each concrete mix.
- C. Erection Drawings: Detail fabrication and installation of precast concrete units.
  - 1. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, openings, extent and location of each finish, connections, support conditions and types of reinforcement, including special reinforcement.
  - 2. Indicate separate face and backup mix locations.

3. Indicate welded connections by AWS standard symbols. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
  4. Indicate locations, tolerances and details of anchorage devices to be embedded in or attached to structure or other construction.
  5. Indicate locations of embedded electrical conduits and devices.
  6. Indicate plans and/or elevations showing member locations with all openings larger than 10 in shown and located.
  7. Indicate location of each precast concrete unit by same identification mark placed on unit.
  8. Indicate relationship of precast concrete members to adjacent materials.
  9. Indicate shim sizes and grouting sequence.
  10. Design Modifications:
    - a. If design modifications are necessary to meet the performance requirements and field conditions, notify the Architect immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units by modifying details or materials. Maintain the general design concept when altering size of members and alignment.
  11. Include handling procedures, sequence of erection, and bracing plan.
- D. Comprehensive engineering design signed and sealed by a professional engineer responsible for its preparation and registered in the state of Illinois.
- E. Fire-Resistance Ratings: For roof and wall panels required to be of fire-resistance rated construction.
- F. Samples: Reference samples for initial verification of design intent, approximately 12 by 12 by 2 inches, representative of finishes, colors, and textures of exposed surfaces of precast concrete panels.
- G. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel.
- H. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names and addresses, names and addresses of architects, engineers and owners, and other information specified.
- I. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
1. Concrete materials.
  2. Reinforcing materials and prestressing tendons.
  3. Admixtures.

4. Bearing pads.

## 1.6 QUALITY ASSURANCE

### A. Erector Qualifications:

1. A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the jobsite. Submit a current Certificate of Compliance furnished by PCI designating qualification in Category S1 (Simple Structural Systems) for horizontal decking members and single-lift wall panels.

### B. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.

1. Assumes responsibility for engineering precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

### C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the state of Illinois and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of precast concrete that are similar to those indicated for this Project in material, design, and extent.

### D. Participates in PCI's Plant Certification program at the time of bidding and is designated a PCI-certified plant for Group CA, Category C1A – Precast Concrete Products (no prestressed reinforcement), C2A – Prestressed Hollow-Core and Repetitive Products, C3A – Prestressed Straight-Strand Structural Members or C4A Prestressed Deflected-Strand Structural Members, as applicable.

### E. Has sufficient production capacity to produce required units without delaying the Work.

### F. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

### G. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of precast concrete units indicated.



- H. Quality-Control Standard: For manufacturing procedures and testing requirements and quality-control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."
  - 1. Comply with camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."
- I. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

### **1.7 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.
- B. Store units, unless otherwise specified, with dunnage across full width of each bearing point.
- C. Place stored units so identification marks are clearly visible, and product can be inspected.
- D. Deliver all precast concrete units to the project site in such quantities and at such times to assure compliance with the schedule and proper setting sequence to ensure continuity of installation.
- E. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Lift and support units only at designated points shown on the Shop Drawings.
- G. Place dunnage of even thickness between each unit.

### **1.8 SEQUENCING**

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

**PART 2 - PRODUCTS****2.1 MOLD MATERIALS**

- A. Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and capable of producing required finish surfaces.
  - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.

**2.2 REINFORCING MATERIALS**

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) or Grade 40 (Grade 300), deformed.

**2.3 PRESTRESSING TENDONS**

- A. Prestressing Strand: ASTM A 416, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand or ASTM A 886, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand (including supplement).

**2.4 ELECTRICAL ACCESSORIES**

- A. See Division 16 Sections for requirements for conduits and devices to be embedded in precast concrete wall panels and structural members.

**2.5 CONCRETE MATERIALS**

- A. Portland Cement: ASTM C 150, Type I or III.
- B. For surfaces exposed to view in finished structure, use same type, brand, and mill source throughout the precast concrete production.
  - 1. Standard gray Portland cement may be used for interior face of precast concrete wall panels.
- C. Supplementary Cementitious Materials:
  - 1. Metakaolin Admixture: ASTM C 618, Class N.

- D. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 5S. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for entire job.
1. Face-Mix Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
  2. Face-Mix Fine Aggregates: Selected, natural or manufactured sand of a material compatible with coarse aggregate to match selected sample finish.
- E. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable and non-fading.
1. For exterior face of precast concrete wall panels, use coloring admixture that will produce an identical match, in the opinion of the Architect, to the existing precast concrete panel color.
  2. For precast beams and columns, use coloring admixture throughout that will, in the opinion of the Architect, produce an identical match to the existing precast concrete panel color
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- G. Air Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
1. Water-Reducing Admixture: ASTM C 494, Type A.
  2. Retarding Admixture: ASTM C 494, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
  6. Plasticizing Admixture: ASTM C 1017.
  7. Admixtures containing calcium chloride, chloride ions or other salts are not permitted.
  8. Corrosion Inhibiting Admixture: Capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

## 2.6 BEARING PADS

1. Provide bearing pads for precast concrete units as shown on the Drawings.

## 2.7 GROUT MATERIALS

- A. Nonshrink Grout: Premixed, packaged ferrous and non-ferrous aggregate shrink-resistant grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A of consistency suitable for application with a 30-minute working time.

## 2.8 INSULATED PANEL ACCESSORIES

- A. Polyisocyanurate Board Insulation: Rigid, cellular polyisocyanurate thermal insulation complying with ASTM C 591 formed by using HCFCs as blowing agents with square edges and thickness as shown on the Drawings.
  - 1. Provide insulation with a flame spread of 75 or less when tested in accordance with ASTM E-84.
- B. Wythe Connectors: Precast manufacturer's standard product manufactured to connect wythes of precast concrete panels.

## 2.9 CONCRETE MIXES

- A. Prepare design mixes for each type of concrete required.
- B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested in accordance with ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): minimum 5000 psi.
  - 2. Release Strength: as required by design.
  - 3. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- F. Add color admixture to concrete mix as directed by the admixture manufacturer in their published instructions.

- G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.
- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

## 2.10 FORM FABRICATION

- A. Form: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete-placement and vibration operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of forms with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
- B. Maintain forms to provide completed precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
  - 1. Form joints are not permitted on faces exposed to view in the finished work.
  - 2. Edge and Corner Treatment: Uniformly chamfered or as built in on standard forms.

## 2.11 FABRICATION, GENERAL

- A. Fabricate roof and wall panels required to be fire-resistance rated in strict conformance with the requirements of the agency providing the fire-resistance rating.

## 2.12 FABRICATION

- A. Cast-in Anchorage Hardware: Accurately position and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
- B. Cast-in conduits and electrical devices located on precast members as indicated on the Drawings. Plug conduits and seal devices to keep free of concrete during casting operations.
- C. Cast-in grooves, slots, holes, and other accessories in precast concrete units as indicated on contract drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without approval of Engineer.

- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabrication, placing, and supporting reinforcement.
1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy coated reinforcing exceeds limits specified ASTM A 775/A 775M repair with patching material compatible with coating material. Epoxy coat bar ends after cutting.
  2. Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Locate and support reinforcement by metal or plastic chairs, runners, bolsters, spacers, hangers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to PCI MNL 116.
  3. Place reinforcing steel and prestressing steel to maintain a minimum 3/4 – inch (19 mm) concrete cover. Increase cover requirements in accordance with ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
- F. Reinforce precast concrete units to resist handling, transportation, and erection stresses.
- G. Prestress tendons for precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
1. Delay detensioning or post-tensioning of precast prestressed concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under the same conditions as concrete member.
  2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
  3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
  4. Recess strand ends and anchorages exposed to view a minimum of 1/2 inch (12 mm), fill with grout and sack rub surface.
  5. Protect strand ends and anchorage exposed to severe environments with bitumastic, zinc-rich or epoxy paint.
- H. Mix concrete according to PCI MNL 116 and requirements in this Section. After concrete batching, no additional water may be added.

- I. Place concrete in a manner to prevent seams or planes of weakness from forming in precast concrete units. Comply with requirements in PCI MNL 116 for measuring, mixing, transporting, and placing concrete.
- J. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
- K. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- L. Comply with ACI 305R recommendations for hot-weather concrete placement.
- M. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete unit on a surface that will not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until the compressive strength is high enough to ensure that stripping does not have an effect on the performance or appearance of the final product.

### **2.13 INSULATED PANEL CASTING**

- A. Cast and screed wythe supported by form.
- B. Immediately place insulation boards, abutting edges and ends of adjacent boards. Stagger end joints between rows to minimize cold joints. Stagger joints of insulation layers one-half board apart. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
- C. Cast and screed top wythe and apply required finish.

### **2.14 FABRICATION TOLERANCES**

- A. Fabricate precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 or PCI MNL 135 product tolerances as well as position tolerances for cast-in items.

**2.15 FINISHES**

- A. Finishes, General: The Basis-of-Design color and texture for the Work of this Phase matches the color and texture of the existing tower precast wall panels where noted.
- B. Commercial (Structural) Finishes. Subject to requirements, including matching the existing precast wall panel color and texture, provide the following finishes and textures at the locations indicated.
  - 1. Standard Grade for Top of Roof Panels and other Unexposed Surfaces: Normal plant-run finishes produced in forms that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls will be acceptable. Fill air holes greater than 1/4 inch in width that occur in high concentration (more than one per 2 in.<sup>2</sup>). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Allowable for joint offset limited to 1/8 inch (3 mm).
  - 2. Grade B Finish for Exposed Faces of Beams and Columns: Fill air pockets and holes larger than 1/4 inch in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch in width that occur in high concentration (more than one per 2 in.<sup>2</sup>). Grind smooth form offsets or fins larger than 1/8 inch. Repair surface blemishes due to holes or dents in forms. Discoloration is permitted at form joints.
  - 3. Grade A Finish for Wall Panels, and Other Surfaces Exposed to View: Repair and/or fill all surface blemishes with the exception of air holes 1/16 inch in width or smaller and form marks where the surface deviation is less than 1/16 inch. Float-apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration is permitted at form joints. Grind smooth all form joints.
  - 4. Finish for Service Counter Top: Repair and/or fill all surface blemishes and form marks where the surface deviation is less than 1/32 inch. Fill shall match concrete color. Grind exposed surfaces of top smooth.
- C. Screed or float finish unformed surfaces not exposed to view. Strike off and consolidate concrete with vibrating screeds to a uniform finish, float finish, if required. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.
- D. Smooth steel-trowel finish unformed surfaces exposed to view. Consolidate concrete, bring to proper level with straightedge, float and trowel to a smooth, uniform finish.
- E. Commercial (Structural) Architectural (CA) Finishes



1. Member faces shall be free of joint marks, grain, or other obvious defects. Corners, including false joints, shall be uniform, straight and sharp. Finish exposed-face surfaces of precast concrete units to match approved design reference sample and as follows:
  - a. Smooth-Surface Finish: Provide surfaces free of excessive air voids, sand streaks, and honeycombs, with uniform color and texture.

## 2.16 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements.
- B. Precast concrete units will be considered deficient if units fail to comply with ACI 318 strength requirements.
- C. Testing: If there is evidence that the concrete strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, fabricator will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42.
  1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
  2. Cores will be tested in an air-dry condition or if units will be wet under service conditions, test cores, after immersion in water, in a wet condition.
  3. Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive strength and no single core is less than 75 percent of the 28-day design compressive strength.
  4. Test results will be made in writing on the same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
    - a. Project identification name and number.
    - b. Date when tests were performed.
    - c. Name of precast concrete fabricator.
    - d. Name of concrete testing agency.
    - e. Identification letter, name, and type of precast concrete units or units represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- D. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast

concrete mix that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

- E. Defective Work: Precast concrete units that do not comply with acceptability requirements in PCI MNL 116, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cracked units may be repaired. The Architect reserves the right to reject any unit if it does not match the accepted samples. Replace unacceptable units with precast concrete units that comply with requirements.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.

### **3.2 EXAMINATION**

- A. Examine supporting structure or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 ERECTION**

- A. Install loose clips, hangers, bearing pads, and other accessories required for connecting precast concrete units to supporting members and backup materials.
- B. Erect precast concrete level, plumb and square within the specified allowable tolerances. Provide temporary structural framing, supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
  - 1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
  - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.

3. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
- C. Connect precast concrete units in position as indicated on approved Erection Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting are completed.
  - D. Connect electrical conduits between panels where indicated on the Drawings.
  - E. Grouting or Dry Packing Connections and Joints: Erection drawings shall indicate joints to be grouted and any critical grouting sequences. Grout open spaces at keyways, connections and joints where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Fill joints completely without seepage to other surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.
    1. Trowel top of grout joints on roofs smooth to prevent any unevenness that might interfere with placing of, or cause damage, to insulation and roofing. Finish transitions due to different surface levels not steeper than 1 to 12.
    2. At Slab Ends (where shown on Drawings): Provide suitable end cap or dam in voids as required.
  - F. Field cutting of precast units is not permitted without approval of the Engineer.
  - G. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units unless approved by Engineer.
  - H. Epoxy Bonding Adhesive: Use two-component epoxy resin adhesive complying with ASTM C 881, 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, non-load bearing, for bonding hardened concrete to hardened concrete.

### 3.4 ERECTION TOLERANCES

- A. Erect precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135. Level out variations between adjacent members by jacking, loading, or any

other feasible method as recommended by the manufacturer and acceptable to the Architect.

### 3.5 REPAIRS

- A. Repairs will be permitted provided structural adequacy, serviceability and durability of units and appearance are not impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- C. Remove and replace damaged precast concrete units that cannot be repaired.

### 3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
  - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
  - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

**END OF SECTION 03460**

**SECTION 04810 - UNIT MASONRY ASSEMBLIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete masonry units (CMUs).
  - 2. Mortar and grout.
  - 3. Reinforcing steel.
  - 4. Masonry joint reinforcement.
  - 5. Ties and anchors.
  - 6. Wall vents.
- B. Related Sections include the following:
  - 1. Division 2 Section "Unit Pavers" for exterior unit masonry paving.
  - 2. Division 7 Section "Joint Sealants" for sealing control and expansion joints in unit masonry.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop drawings for the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
  - 2. Samples for Initial Selection: For the following, including manufacturer's full range of colors and textures:
    - a. Colored concrete masonry units, in the form of small-scale units.
    - b. Ground face concrete masonry units, in the form of small-scale units.
    - c. Colored mortar.

- C. Samples for Verification: For each type and color of the following:
1. Exposed concrete masonry units.
  2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project. Label Samples to indicate types and amounts of pigments used.
  3. Wall vents.
- D. Material Certificates: Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards. Provide for each type and size of the following:
1. Masonry units.
    - a. Include material test reports substantiating compliance with requirements.
  2. Cementitious materials. Include brand, type, and name of manufacturer.
  3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
  4. Grout mixes. Include description of type and proportions of ingredients.
  5. Reinforcing bars.
  6. Joint reinforcement.
  7. Anchors, ties, and metal accessories.
- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

#### 1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1093 for testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for

each cementitious component and from one source or producer for each aggregate.

- E. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.2, "Structural Welding Code--Aluminum."
- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.
- G. Source Limitations for Wall Vents: Obtain wall vents from a single manufacturer and from one source.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

### 1.6 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- F. Field Measurements: Verify vent openings by field measurements before fabrication and indicate measurements on Shop Drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating vents without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

## **PART 2 - PRODUCTS**

### **2.1 MASONRY UNITS, GENERAL**

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to exceed tolerances and to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects, including dimensions that vary from specified dimensions by more than stated tolerances, will be exposed in the completed Work or will impair the quality of completed masonry.

### **2.2 CONCRETE MASONRY UNITS (CMUs)**

- A. Shapes: Provide shapes indicated and as follows:



1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  2. Provide bullnose units for outside corners, unless otherwise indicated.
- B. Concrete Masonry Units: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
  2. Weight Classification: Normal weight.
  3. Size: 8-inches high x 16-inches long x thickness shown on the Drawings.
  4. Pattern and Texture:
    - a. Standard pattern, ground finish where indicated.
    - b. Provide manufacturer's standard face texture where no finish is specified.

### 2.3 MASONRY LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from concrete masonry lintel units matching the adjacent masonry color, finish and texture with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

### 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products:

- a. Bayer Corporation, Industrial Chemicals Div.; Bayferrox Iron Oxide Pigments.
  - b. Davis Colors; True Tone Mortar Colors.
  - c. Solomon Grind-Chem Services, Inc.; SGS Mortar Colors.
- E. Aggregate for Grout: ASTM C 404. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
- G. Colored Cement Product: Packaged blend made from portland cement and lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Formulate blend as required to produce color selected from manufacturer's standard colors.
  2. Pigments shall not exceed 10 percent of portland cement by weight.
  3. Products:
    - a. Colored Portland Cement-Lime Mix:
      - 1) Capital Materials Corporation; Riverton Portland Cement Lime Custom Color.
      - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
      - 3) Lafarge North America Inc.; Eaglebond.
      - 4) Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
- H. Water: Potable.

## 2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615 or ASTM A 996, Grade 60, unless noted otherwise.
- B. Masonry Joint Reinforcement, General: ASTM A 951.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

## 2.6 MISCELLANEOUS ANCHORS

- A. Postinstalled Anchors: Provide [anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed

in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

## 2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

## 2.8 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  1. Manufacturers:
    - a. Diedrich Technologies, Inc.
    - b. EaCo Chem, Inc.
    - c. ProSoCo, Inc.

## 2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Limit cementitious materials in mortar to portland cement and lime.
  3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. Pigments shall not exceed 10 percent of portland cement by weight.
  2. Pigments shall not exceed 5 percent of by weight.
  3. Mix to match approved sample.
- D. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- E. Grout for Unit Masonry: Comply with ASTM C 476
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

## 2.10 WALL VENT MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Wall Vents:
    - a. Airline Products Co.
    - b. Airolite Company (The).
    - c. Arrow United Industries.
    - d. Construction Specialties, Inc.
    - e. Dowco Products Group; Safe-Air of Illinois, Inc.
    - f. Greenheck.
    - g. Hohmann & Barnard, Inc.
    - h. Industrial Louvers, Inc.
    - i. Reliable Products; Hart & Cooley, Inc.
    - j. Riesner Vent Brick Corp.
    - k. Ruskin Company; Tomkins PLC.
    - l. Sunvent Industries; Sylro Sales Corp.

## 2.11 WALL VENT MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy 6063-T5 or T-52.

- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Of 300 Series stainless steel. Do not use metals that are incompatible with joined materials.
  - 1. Use types and sizes to suit unit installation conditions.
  - 2. Use tamper-resistant screws for exposed fasteners.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.12 WALL VENT FABRICATION, GENERAL

- A. Assemble wall vents in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal vent blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
  - 1. Frame Type: Exterior flange, unless otherwise indicated.
- D. Join frame members to each other and to fixed louver blades with fillet welds concealed from view.

## 2.13 WALL VENTS

- A. Extruded-Aluminum Wall Vents: Extruded-aluminum louvers and frames, not less than 0.125-inch nominal thickness, assembled by welding; with 18-by-14- mesh, aluminum insect screening on inside face; incorporating weep holes, continuous drip at sill, and integral waterstop on inside edge of sill; of load-bearing design and construction.

## 2.14 ALUMINUM FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish wall vents after assembly.

**2.15 ALUMINUM FINISHES**

- A. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION, GENERAL**

- A. Thickness: Build cavity walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.

1. Mix units from several pallets or cubes as they are placed.
- F. Comply with construction tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
  2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
  3. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
  4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
  5. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

### 3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.

- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Shear wall connections to precast concrete roof panels: Cut top course of wall to follow angle of precast concrete roof panels. Lay one course full-height course of bond beam block below cut block course. Reinforce and grout courses as shown on the Structural Drawings.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer of at least 2" diameter.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.

### 3.6 LINTELS

- A. Provide masonry lintels where shown and where openings of more than 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

### 3.7 WALL VENT INSTALLATION

- A. Locate and place vents level and plumb.



- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants.
- E. Protect nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.

### **3.8 WALL VENT ADJUSTING AND CLEANING**

- A. Clean exposed surfaces of vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

### **3.9 REPAIRING, POINTING, AND CLEANING**

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
4. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

### **3.10 MASONRY WASTE DISPOSAL**

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

**END OF SECTION 04810**

**SECTION 05500 - METAL FABRICATIONS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Steel framing and supports for mechanical and electrical equipment not specified in other Sections.
  - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- B. Related Sections include the following:
  - 1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
  - 2. Division 4 Section "Unit Masonry Assemblies" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.

**1.3 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Paint products.
  - 2. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  - 2. Provide templates for anchors and bolts specified for installation under other Sections.
  - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer registered in the state of Illinois responsible for their preparation.

- C. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- D. Welding certificates.
- E. Qualification Data: For professional engineer.

#### 1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."
  - 2. AWS D1.3, "Structural Welding Code--Sheet Steel."

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Products: Subject to compliance with requirements, provide one of the products specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

#### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

#### 2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- C. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
  - 1. Size of Channels: 1-5/8 by 1-5/8 inches.

## 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Plain Washers: Round, ASME B18.22.1.
- H. Lock Washers: Helical, spring type, ASME B18.21.1.
- I. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with top coating system.
  - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required,

use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.

- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## **2.7 MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Fabricate units from slotted channel framing where indicated.
  - 2. Furnish inserts if units are installed after concrete is placed.

## **2.8 FINISHES, GENERAL**

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

## **2.9 STEEL AND IRON FINISHES**

- A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- B. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.



**3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS**

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

**3.3 ADJUSTING AND CLEANING**

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

**END OF SECTION 05500**

**SECTION 05521 – STAINLESS STEEL GUARD RAILINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Stainless-steel tube railings.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
  - 1. Stainless Steel: 60 percent of minimum yield strength.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Top Rails of Guards
    - a. Uniform load of 50-lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Intermediate and Bottom Rails of Guards:
    - a. Concentrated load of 200 lbf applied in any direction.
    - b. Uniform and concentrated loads need not be assumed to act concurrently.

3. Infill of Guards:
  - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
  - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### 1.4 SUBMITTALS

- A. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer registered in the state of Illinois responsible for their preparation.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Qualification Data: For professional engineer.
- D. Welding certificates.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to the following:
  1. AWS D1.6, "Structural Welding Code--Stainless Steel."

**1.6 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

**PART 2 - PRODUCTS****2.1 METALS, GENERAL**

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

**2.2 STAINLESS STEEL**

- A. Tubing: ASTM A 554, Grade MT 316L.
- B. Pipe: ASTM A 312/A 312M, Grade TP 316L.
- C. Plate and Sheet: ASTM A 666, Type 316L.

**2.3 FASTENERS**

- A. General: Provide the following:
  - 1. Stainless-Steel Railings: Type 316 stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of resisting design loads.
- C. Fasteners for Interconnecting Railing Components:
  - 1. All connections welded and ground smooth.

**2.4 MISCELLANEOUS MATERIALS**

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

## 2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- H. Connections: Fabricate railings with welded connections, unless otherwise indicated.
- I. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- J. Close exposed ends of railing members with prefabricated end fittings.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

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

## 2.7 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine existing weld plate installations in cast-in-place concrete decks.

### 3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting, except as noted below.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.

### **3.3 RAILING CONNECTIONS**

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

### **3.4 ANCHORING POSTS**

- A. Weld posts to weld plates cast into existing concrete slabs. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

### **3.5 ADJUSTING AND CLEANING**

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

### **3.6 PROTECTION**

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

**END OF SECTION 05521**

**SECTION 05525 – STAIR INFILL PANELS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Stainless-steel mesh infill guard panels at existing tower stair.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: In engineering mesh panels to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
  - 1. Stainless Steel: 60 percent of minimum yield strength.
- B. Structural Performance: Provide mesh panels capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Infill Guard Panels:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
    - b. Infill load and other loads need not be assumed to act concurrently.
- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

**1.4 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Stainless steel mesh.



- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer registered in the state of Illinois responsible for their preparation.
- C. Samples for Verification: For each type of exposed finish required.
- D. Qualification Data: For professional engineer.

### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of panel product through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.6, "Structural Welding Code--Stainless Steel."

### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of supports and other construction contiguous with mesh panels by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Install stair infill panels after final painting of existing stair rails and supporting structural members has been completed.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

### 2.2 STAINLESS STEEL

- A. Plate and Sheet: ASTM A 666, Type 304.
- B. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 580/A 580M, Type 304.

## 2.3 FASTENERS

- A. General: Provide the following:
  - 1. Stainless-Steel Mesh panels: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring Mesh Panels to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring mesh panels to other types of construction indicated and capable of withstanding design loads.

## 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

## 2.5 FABRICATION

- A. General: Fabricate mesh panels to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble mesh panels in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line with accurate angles and surfaces.
- E. Cut, reinforce and drill panels to receive field installed bolts and similar items.
- F. Connections: Fabricate mesh panels with welded connections, unless otherwise indicated.
- G. Welded Connections:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- H. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from stainless steel.
  1. Orient wire mesh with wires perpendicular and parallel to top rail.
  2. Fabricate panels with top and bottom channel frames aligned with rake of stair.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Provide exposed fasteners with finish matching appearance of panel frames.

## 2.7 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Dull Satin Finish: No. 6.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform drilling, and fitting required for installing mesh panels. Set mesh panels accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of panel components that have been finished after fabrication and that are intended for field connection by mechanical means without further cutting or fitting.
  2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust mesh panels before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Bolt panels to existing supporting construction. Use anchorage devices and fasteners where necessary for securing mesh panels and for properly transferring loads to in-place construction.

### **3.2 ADJUSTING AND CLEANING**

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Touch up painted surfaces with surface coating specified in Division 9 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

### **3.3 PROTECTION**

- A. Protect finishes of mesh panels from damage during construction period with temporary protective coverings approved by railing manufacturer.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

**END OF SECTION 05525**

**SECTION 05530 - GRATINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Glass-fiber-reinforced plastic gratings.

**1.3 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Glass-fiber-reinforced plastic gratings.
  - 2. Clips and anchorage devices for gratings.

**1.4 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Glass-Fiber-Reinforced Plastic Gratings:
  - a. Creative Pultrusions, Inc.
  - b. Enduro Systems Inc.; Composite Products Division.
  - c. Fibergrate Composite Structures Inc.
  - d. Fisher & Ludlow.
  - e. IKG Industries; a Harsco Company.
  - f. Seasafe, Inc.
  - g. Strongwell.

## 2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

## 2.3 FABRICATION

- A. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- B. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
- C. Fit exposed connections accurately together to form hairline joints.
- D. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place.

## 2.4 GLASS-FIBER-REINFORCED PLASTIC GRATINGS

- A. Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings assembled from components made by simultaneously pulling glass fibers and extruding thermosetting plastic resin through a heated die under pressure to produce a product without voids and with a high glass-fiber content.
  1. Configuration: As indicated on the Drawings.
  2. Resin Type: Polyester or Vinylester.

3. Color: As selected by the Architect from the manufacturer's full range of colors.
- B. Fabricate grating and anchorage for easy removal for access to fountain equipment below.

## **2.5 GRATING FRAMES AND SUPPORTS**

- A. Frames and Supports for Glass-Fiber-Reinforced Plastic Gratings: Fabricate from glass-fiber-reinforced plastic shapes of sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
1. Unless otherwise indicated, use shapes made from same resin and in same color as gratings.
  2. Equip units indicated to be cast into concrete or built into masonry with integral anchors.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
- C. Fit exposed connections accurately together to form hairline joints.

### **3.2 INSTALLING GLASS-FIBER-REINFORCED PLASTIC GRATINGS**

- A. Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard stainless-steel anchor clips and hold-down devices for bolted connections.

**END OF SECTION 05530**

**SECTION 05811 - ARCHITECTURAL JOINT SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Architectural joint systems for building exteriors.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for masonry wall joint systems.
  - 2. Division 7 Section "Roof Expansion Assemblies" for factory-fabricated roof joint systems.
  - 3. Division 7 Section "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
  - 4. Division 7 Section "Joint Sealants" for liquid-applied joint sealants and for pre-compressed expanding foam sealants.

**1.3 DEFINITIONS**

- A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
- C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage (plus or minus) of nominal value of joint width.
- D. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.



#### 1.4 SUBMITTALS

- A. Shop Drawings: Provide the following for each joint system specified:
  - 1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
  - 2. Architectural Joint System Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
    - a. Manufacturer and model number for each joint system.
    - b. Joint system location cross-referenced to Drawings.
    - c. Nominal joint width.
    - d. Movement capability.
    - e. Classification as thermal or seismic.
    - f. Materials, colors, and finishes.
    - g. Product options.
    - h. Fire-resistance ratings.
- B. Samples for Initial Selection: For each type of joint system indicated.
  - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.
- C. Samples for Verification: For each type of architectural joint system indicated.
  - 1. Full width by 6 inches long, for each system required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for current products.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain architectural joint systems through one source from a single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

## 1.6 COORDINATION

- A. Coordinate installation of exterior wall, fascia and soffit joint systems with roof expansion assemblies to ensure that wall transitions are watertight. Roof expansion assemblies are specified in Division 7.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.
  1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
  2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- B. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Moisture Barrier: Flexible elastomeric material, Santoprene.
- D. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

### 2.2 ARCHITECTURAL JOINT SYSTEMS, GENERAL

- A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
  1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where joint changes direction or abuts other materials.
  2. Include factory-fabricated closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint systems.

- B. Design architectural joint systems for the following size and movement characteristics:
1. Nominal Joint Width: 2-inches.
  2. Maximum Joint Width: 3-1/4-inches.
  3. Minimum Joint Width: 3/4-inch.
  4. Type of Movement: Seismic.

### 2.3 ARCHITECTURAL JOINT SYSTEMS

- A. Wall and Soffit Joint Systems:
1. Basis-of-Design Product: The Drawings and Specification are based upon SF-500 expansion joints as manufactured by Construction Specialties, Inc. Subject to requirements provide either the named product or a comparable product manufactured by one of the following:
    - a. Architectural Art Mfg., Inc.
    - b. Balco, Inc.
    - c. JointMaster/InPro Corporation.
    - d. Michael Rizza Company, LLC.
    - e. MM Systems Corporation.
    - f. Nystrom, Inc.
    - g. Watson Bowman Acme Corp.
  2. Type: Dual elastomeric seal.
    - a. Seal Material: Santoprene.
      - 1) Color: As selected by Architect from manufacturer's full range.
  3. Moisture Barrier: Manufacturer's standard.

### 2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine surfaces where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Prepare substrates according to architectural joint system manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

**3.3 INSTALLATION**

- A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
  - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
  - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
  - 4. Locate in continuous contact with adjacent surfaces.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.

3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
- E. Water Barrier: Provide water barrier at exterior joints with drainage fittings to drain moisture to the exterior.

### 3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

**END OF SECTION 05811**

**SECTION 06105 - MISCELLANEOUS CARPENTRY****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Wood blocking and nailers.
  - 2. Plywood backing panels.

**1.3 DEFINITIONS**

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. SPIB - Southern Pine Inspection Bureau.

**1.4 SUBMITTALS**

- A. Product Data: For each type of process.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing and installing treated material.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
  - 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Power-driven fasteners.
  4. Expansion anchors.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  3. Provide dressed lumber, S4S, unless otherwise indicated.
  4. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
- B. Wood Structural Panels:
1. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
  2. Thickness: As needed to comply with requirements specified but not less than thickness indicated.
  3. Factory mark panels according to indicated standard.

### 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and the following:
  - a. Chromated copper arsenate (CCA).
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  1. Wood nailers, curbs, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
  3. Wood framing members less than 18 inches above grade.
  4. Wood floor plates that are installed over concrete slabs directly in contact with earth.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Except at locations requiring preservative-treatment, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
  1. Use treatment for which chemical manufacturer publishes physical properties of treated wood after exposure to elevated temperatures, when tested by a qualified independent testing agency according to ASTM D 5664, for lumber and ASTM D 5516, for plywood.
  2. Use treatment that does not promote corrosion of metal fasteners.
  3. Use Exterior type where indicated.

### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including the following:
  1. Blocking.
  2. Nailers.



- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content, mixed southern pine; SPIB.
- C. For exposed boards, provide lumber with 15 percent maximum moisture content, mixed southern pine, B & B Finish grade; SPIB.
- D. For concealed boards, provide lumber with 19 percent maximum moisture content, mixed southern pine, No. 2 grade; SPIB.

## 2.5 PANEL PRODUCTS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, not less than 1/2 inch thick.

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- F. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

**PART 3 - EXECUTION****3.1 INSTALLATION, GENERAL**

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

**3.2 WOOD BLOCKING, AND NAILER INSTALLATION**

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

**END OF SECTION 06105**

**SECTION 07131 - SELF-ADHERING SHEET WATERPROOFING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Modified bituminous sheet waterproofing, fabric reinforced.
  - 2. Molded-sheet drainage panels.
- B. Related Sections include the following:
  - 1. Division 2 Section "Subdrainage" for foundation drains and installation requirements.
  - 2. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.

**1.3 SUBMITTALS**

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Samples: For the following products:
  - 1. 12-by-12-inch square of waterproofing and flashing sheet.
  - 2. 4-by-4-inch square of drainage panel.
- D. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- E. Qualification Data: For Installer.

- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- G. Warranties: Special warranties specified in this Section.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations: Obtain waterproofing materials and molded-sheet drainage panels through one source from a single manufacturer.
- C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
  - 1. If Architect determines mockups do not comply with requirements, reapply waterproofing until mockups are approved.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
  - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

## 1.7 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
  - 1. Failure includes, but is not limited to, failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch in width.
  - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Installer's Warranty: Warranty form, signed by Installer, covering Work of this Section, for warranty period of two years.

## PART 2 - PRODUCTS

### 2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet, Fabric Reinforced: 60-mil- thick, self-adhering sheet consisting of rubberized-asphalt membrane embedded in spun-bonded polyester or fiberglass nonwoven fabric reinforcement laminated to a 0.50-mil-thick polyester film with release liner on adhesive side.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Protecto Wrap Company; Jiffy Seal 140/60.
    - b. Royston Laboratories, Div. of Chase Corporation; Royal-Gard.
  - 2. Physical Properties:
    - a. Pliability: No cracks when bent 180 degrees over a 1-inch mandrel at minus 25 deg F; ASTM D 146.

- b. Hydrostatic-Head Resistance: 150 feet minimum.
- c. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

## 2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
  - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- H. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

## 2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side with a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
  - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
  - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 SURFACE PREPARATION**

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
  - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch in accordance with manufacturer's published instructions.
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
  - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
    - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.

- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

### 3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
  - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Apply continuous sheets over sheet strips bridging substrate cracks, panel, construction, and contraction joints.
- E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic. Install metal termination bars where recommended by manufacturer in their published instructions.
- F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- G. Install protection course with butted joints over waterproofing membrane immediately.
  - 1. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
- H. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.



**3.4 MOLDED-SHEET DRAINAGE PANEL INSTALLATION**

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

**3.5 FIELD QUALITY CONTROL**

- A. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

**3.6 PROTECTION AND CLEANING**

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION 07131**

**SECTION 07210 - BUILDING INSULATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Perimeter insulation under slabs-on-grade.
- B. Related Sections include the following:
  - 1. Division 7 Section " EPDM Membrane Roofing" for insulation specified as part of roofing construction.
  - 2. Division 15 Section "Mechanical Insulation."

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
  - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### **2.2 FOAM-PLASTIC BOARD INSULATION**

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below:
  1. Manufacturers:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company.
    - c. Owens Corning.
    - d. Pactiv Building Products Division.
  2. Type VI, 1.80-lb/cu. ft.

### **2.3 AUXILIARY INSULATING MATERIALS**

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

**3.3 INSTALLATION, GENERAL**

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

**3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION**

- A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
  - 1. If not otherwise indicated, extend insulation a minimum of 30 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

**3.5 PROTECTION**

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION 07210**

**SECTION 07531 - EPDM MEMBRANE ROOFING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Adhered membrane roofing system.
  - 2. Roof insulation.
- B. Related Sections include the following:
  - 1. Division 6 Section "Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
  - 2. Division 7 Section "Roof Accessories" for roof hatches.
  - 3. Division 7 Section "Manufactured Roof Specialties" for metal roof flashings, and counterflashings.
  - 4. Division 7 Section "Roof Expansion Assemblies."
  - 5. Division 7 Section "Joint Sealants."

**1.3 DEFINITIONS**

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

**1.4 PERFORMANCE REQUIREMENTS**

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
- D. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
  - 1. Fire/Windstorm Classification: Class 1A- 90.
  - 2. Hail Resistance: SH.

## 1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
  - 1. Base flashings and membrane terminations.
- C. Samples for Verification: For the following products:
  - 1. 12-by-12-inch square of sheet roofing, of color specified, including T-shaped side and end lap seam.
  - 2. 12-by-12-inch square of roof insulation.
  - 3. 12-inch length of metal termination bars.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  - 1. Submit evidence of meeting performance requirements.
- F. Qualification Data: For Installer and manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

- H. Research/Evaluation Reports: For components of membrane roofing system.
- I. Maintenance Data: For roofing system to include in maintenance manuals.
- J. Warranties: Special warranties specified in this Section.
- K. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has FMG approval for membrane roofing system identical to that used for this Project.
- C. Source Limitations: Obtain components for membrane roofing system from same manufacturer as roofing membrane or approved by roofing membrane manufacturer in writing.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
  - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- E. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
  - 1. Meet with Owner; Architect; Owner's insurer if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.



3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

### **1.7 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

### **1.8 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

### **1.9 WARRANTY**

- A. Special Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane

roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roof insulation, cover boards and other components of membrane roofing system.
  2. Warranty Period: 15 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### **2.2 EPDM ROOFING MEMBRANE**

- A. EPDM Roofing Membrane: ASTM D 4637, Type II, scrim or fabric internally reinforced uniform, flexible sheet made from EPDM, and as follows:
1. Manufacturers:
    - a. Carlisle SynTec Incorporated.
    - b. Celotex Corporation.
    - c. ERSystems.
    - d. Firestone Building Products Company.
    - e. GenFlex Roofing Systems.
    - f. International Diamond Systems.
    - g. Johns Manville International, Inc.
    - h. Mule-Hide Products Co., Inc.
    - i. Protective Coatings, Inc.
    - j. Roofing Products International, Inc.

- k. Stafast Roofing Products.
  - l. Versico Inc.
- 2. Thickness: 60 mils, nominal.
  - 3. Exposed Face Color: White.

### 2.3 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
  - 1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil- thick EPDM, partially cured or cured, according to application.
- C. Bonding Adhesive: Manufacturer's standard bonding adhesive.
- D. Seaming Material: Single-component butyl splicing adhesive and splice cleaner or synthetic-rubber polymer primer and 3-inch- wide minimum, butyl splice tape with release film, as recommended by roof system manufacturer for the applications.
- E. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.
- F. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- G. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- H. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- I. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- J. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

## 2.4 ROOF INSULATION

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces.
  - 1. Manufacturers:
    - a. AlliedSignal Inc.; Commercial Roofing Systems.
    - b. Apache Products Company.
    - c. Atlas Roofing Corporation.
    - d. Carlisle SynTec Incorporated.
    - e. Celotex Corporation.
    - f. Firestone Building Products Company.
    - g. GAF Materials Corp.
    - h. GenFlex Roofing Systems.
    - i. Hunter Panels, LLC.
    - j. Johns Manville International, Inc.
    - k. Koppers Industries.
    - l. RMAX.

## 2.5 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
- C. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, 1/2 inch thick.
  - 1. Product: Subject to compliance with requirements, provided "Dens-Deck DuraGuard Roof Board" manufactured by Georgia-Pacific Corporation.

## 2.6 ASPHALT MATERIALS

- A. Roofing Asphalt: ASTM D 312, Type III or IV or ASTM D 6152, SEBS modified, as recommended by the roofing system manufacturer for the application.
- B. Asphalt Primer: ASTM D 41.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify that roof openings and penetrations are in place and set and braced.
  - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
  - 3. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
  - 4. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 5. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
  - 6. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from spilling or migrating onto surfaces of other construction.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

**3.3 INSULATION INSTALLATION**

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install two layers of insulation under area of roofing to achieve required thickness. Install layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- E. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
  - 1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. and allow primer to dry.
  - 2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.
  - 3. Set each layer of insulation in a cold fluid-applied adhesive.
- F. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Loosely butt cover boards together and fasten to roof deck.
  - 1. Fasten insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
  - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

### 3.4 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install fleece-backed roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Mechanically or adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

- G. Seam Installation: Install seams by one of the following methods, as recommended by the roofing system manufacturer in their published instructions:
  - 1. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
    - a. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
  - 2. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing membrane terminations.
- H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
- I. Spread sealant or mastic bed over scupper and gutter edge flashings before installation of membrane.

### 3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

**3.6 FIELD QUALITY CONTROL**

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
  - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
- B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

**3.7 PROTECTING AND CLEANING**

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

**END OF SECTION 07531**



**SECTION 07710 - MANUFACTURED ROOF SPECIALTIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following manufactured roof specialties:
  - 1. Roof edge flashings.
  - 2. Roof edge drainage systems.
- B. Related Sections include the following:
  - 1. Division 6 Section " Miscellaneous Carpentry" for wood nailers, curbs, and blocking.
  - 2. Division 7 Section "Joint Sealants" for field-applied sealants.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Manufacture and install manufactured roof specialties to resist thermally induced movement and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. FMG Listing: Manufacture and install roof edge flashings that are listed in FMG's "Approval Guide" and approved for Windstorm Classification, Class 1- 90. Identify materials with FMG markings.
- C. Manufacture and install roof edge flashings tested according to SPRI ES-1, "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems", current edition and as follows:
  - 1. Roof Edge Termination of Single-Ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum of 100 lbs/ft in accord with the ANSI/SPRI ES-1-98 Test Method RE-1.
  - 2. Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI ES-1-98 Test Method RE-2.

- D. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to building interior.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of manufactured roof specialties, including plans and elevations. Identify factory- vs. field-assembled work. Include the following:
  - 1. Details for fastening, joining, supporting, and anchoring manufactured roof specialties including fasteners, clips, cleats, and attachments to adjoining work.
  - 2. Details for expansion and contraction.
- C. Samples for Initial Selection: For each type of manufactured roof specialty indicated with factory-applied color finishes.
- D. Fabrication Samples: For roof edge flashings, roof edge drainage systems and counterflashings made from 12-inch lengths of full-size components including fasteners, cover joints, accessories, and attachments.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, verifying compliance of roof edge flashings with performance requirements.
- F. Warranty: Special warranty specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics.

Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

## 1.6 COORDINATION

- A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

## 1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace manufactured roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
  1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Products: Subject to compliance with requirements, provide one of the products specified.

2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
3. Basis-of-Design Product: The designs for roof edge flashings, roof edge drainage system and counterflashings are based on the products named. Subject to compliance with requirements, provide either the named products or comparable products by one of the other manufacturers specified.

## 2.2 EXPOSED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and finish indicated, finished as follows:
  1. Surface: Smooth, flat finish.
  2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
    - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.

## 2.3 CONCEALED METALS

- A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and structural performance indicated, mill finished.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Manufacturer's recommended stainless steel fasteners, suitable for application and designed to withstand design loads.
  1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.

- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant, depending upon location; of type, grade, class, and use classifications required to seal joints in Manufactured Roof Specialties and remain watertight. See Section 07920 "Joint Sealants".
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- H. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

## 2.5 ROOF EDGE FLASHINGS

- A. Roof Edge Fascia: Manufactured, two-piece, roof edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed- or extruded-aluminum anchor bar with integral drip edge cleat to engage fascia cover. Provide matching mitered and welded corner units.
  - 1. Basis-of-Design Product: Metal-Era Anchor-Tite Fascia system or a comparable product by one of the following:
  - 2. Manufacturers:
    - a. Hickman, W. P. Company.
    - b. Metal-Era, Inc.
    - c. MM Systems Corporation.
  - 3. Fascia Cover: Fabricated from the following exposed metal:
    - a. Formed Aluminum: 0.040 inch thick.
  - 4. Fascia Cover Color: As selected by Architect from manufacturer's full range.
  - 5. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

6. Fascia Accessories: Custom fabricated fascia extenders with continuous hold-down cleats fabricated as follows:
  - a. Formed Aluminum: 0.050 inch thick.
  - b. Fascia Cover Color: As selected by Architect from manufacturer's full range.
  - c. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

## 2.6 ROOF EDGE DRAINAGE SYSTEMS

- A. Basis-of-Design Product: Metal-Era Seal-Tite Industrial Gutter System (IG-2) or a comparable product by one of the following:
- B. Manufacturers:
  1. Hickman, W. P. Company.
  2. MM Systems Corporation.
- C. Gutters and Downspouts: Manufactured formed gutter in uniform section lengths not exceeding 12 feet, with mitered and welded or soldered corner units, end caps, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front gutter rim. Furnish with flat-stock gutter straps and gutter support brackets and expansion joints and expansion-joint covers fabricated from same metal as gutters.
  1. Fabricate gutter from the following exposed metal:
    - a. Aluminum: 0.050 inch thick.
  2. Gutter Accessories: Bronze wire ball downspout strainer.
  3. Downspouts: Rectangular closed-face with mitered elbows, manufactured from the following exposed metal. Furnish wall brackets, from same material and finish as downspouts, with anchors.
    - a. Formed Aluminum: 0.040 inch thick.
  4. Gutter and Downspout Color: Match fascia color.

## 2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- C. 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**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
  - 1. Examine walls, roof edges, and parapets for suitable conditions for manufactured roof specialties.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.
  - 1. Install manufactured roof specialties with provisions for thermal and structural movement.
  - 2. Torch cutting of manufactured roof specialties is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Coat concealed side of uncoated aluminum manufactured roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
  - 2. Underlayment: Where installing exposed-to-view components of manufactured roof specialties directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.

3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Install manufactured roof specialties level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.
- D. Install manufactured roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
- E. Expansion Provisions: Provide for thermal expansion of exposed manufactured roof specialties. Space movement joints at a maximum of 12 feet with no unplanned joints within 18 inches of corners or intersections.
- F. Fasteners: Use fasteners of type and size recommended by manufacturer but of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- G. Seal joints with elastomeric or butyl sealant as required by manufacturer of roofing specialties and depending upon joint location. See Section 17920 "Joint Sealants."

### **3.3 ROOF EDGE FLASHING INSTALLATION**

- A. Install anchor bar and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings to resist uplift and outward forces according to performance requirements.
- C. Install sealant recommended by flashing system and roof membrane manufacturer under anchor bar.

### **3.4 ROOF EDGE DRAINAGE SYSTEM INSTALLATION**

- A. General: Install gutters and downspouts to produce a complete roof drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Gutters: Join and seal gutter lengths. Attach gutters to firmly anchored straps spaced not more than 30 inches apart. Slope gutters to downspouts.
  1. Install gutter with expansion joints at locations not exceeding 50 feet apart. Install expansion joint caps.



**3.5 COUNTERFLASHING INSTALLATION**

- A. Counterflashings: Coordinate installation of counterflashings with installation of base flashings. Insert counterflashings in reglets or receivers and fit tightly to base flashings. Extend counterflashings 4 inches over base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

**3.6 CLEANING AND PROTECTION**

- A. Remove temporary protective coverings and strippable films as manufactured roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- B. Replace manufactured roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

**END OF SECTION 07710**

**SECTION 07716 - ROOF EXPANSION ASSEMBLIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Metal-flanged, bellows-type roof expansion assemblies.
- B. Related Sections include the following:
  - 1. Division 6 Section "Miscellaneous Carpentry" for wooden curbs for mounting roof expansion assemblies.
  - 2. Division 7 Section "EPDM Membrane Roofing."
  - 3. Division 7 Section "Manufactured Roof Specialties" for shop-fabricated sheet metal flashing.
  - 4. Division 7 Section "Manufactured Roof Specialties" for other manufactured roof items.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Provide roof expansion assemblies that, when installed, remain watertight within movement limitations specified by manufacturer.
- B. Fire-Resistance Rating: Provide roof expansion assemblies that have a fire-resistance rating of 1-1/2 hours minimum.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, joints, splices, locations of joints and splices, intersections, transitions, fittings, and attachments to other work. Where joint assemblies change planes, provide isometric drawings depicting how components interconnect to achieve continuity.

- C. Research/Evaluation Reports: For roof expansion assemblies.
- D. Warranties: Special warranties specified in this Section.
- E. Qualification Data: For Installer.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of roof membrane.
- B. Source Limitations: Obtain metal-flanged, bellows-type roof expansion assemblies approved by roofing membrane manufacturer and that are part of roofing membrane warranty.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of roof expansion assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Fire-Test-Response Characteristics: Provide fire-barrier assemblies with fire-test-response characteristics not less than that of adjacent construction, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Assemblies shall be capable of anticipated movement while maintaining fire rating. Identify assemblies with appropriate markings of applicable testing and inspecting agency.
  - 1. Fire-Resistance Ratings: UL 2079.

### 1.6 SCHEDULING

- A. Coordinate delivery and installation of roof expansion assemblies to prevent damage and provide timely integration of units with roofing membranes and flashing.

### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace roof expansion assemblies that leak, deteriorate in excess of rates specified in manufacturer's published product literature, or otherwise fail to perform within specified warranty period.

1. Warranty Period: Fifteen years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Products: Subject to compliance with requirements, provide one of the products specified.

### **2.2 METALS**

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation G90, stretcher-leveled standard of flatness and either commercial or forming steel, minimum 0.019 inch thick.

### **2.3 MISCELLANEOUS MATERIALS**

- A. Roof Cement: ASTM D 4586, Type II.
- B. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant, as recommended by the seal manufacturer; of type, grade, class, and use classifications required to seal joints in Manufactured Roof Specialties and to remain watertight.
- C. Mineral-Fiber Blanket: ASTM C 665.
- D. Flexible Cellular Sponge or Expanded Rubber: ASTM D 1056.
- E. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
  1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.

### **2.4 FIRE BARRIERS**

- A. Fire Barriers: Devices complying with requirements specified in Part 1 "Quality Assurance" Article for fire-test-response characteristics and designed for dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Provide roof expansion assemblies with

manufacturer's continuous, standard, flexible fire-barrier seals in back of joint system at locations indicated to provide fire-resistance rating not less than rating of adjacent construction.

## 2.5 BELLOWS-TYPE ROOF EXPANSION ASSEMBLIES

- A. Metal-Flanged, Bellows-Type Roof Expansion Assemblies: Provide manufacturer's standard assemblies of sizes and types indicated, with prefabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, coatings, and other components as recommended by roof expansion assembly manufacturer for complete installation. Fabricate assemblies specifically for roof-to-wall applications.
- B. Provide assemblies consisting of exposed polymeric sheet over foam bellows, securely anchored at both edges to 3- to 4-inch- wide sheet metal nailing flanges, either flat or angle formed to fit cant or curbs as required. Insulate bellows with closed-cell, flexible rubber or plastic foam not less than 5/16 inch thick; adhere bellows to underside of polymeric sheet.
1. Products:
    - a. Architectural Art Mfg., Inc.; T Series Roof Expansion Cover.
    - b. Balco Metalines, a division of Balco, Inc.; Type BRBG-SE Roof Bellows.
    - c. BMCA Insulation Products, Inc., GAF Materials Corporation; Metalastic.
    - d. C/S Group; Model BRJW.
    - e. Johns Manville; Style EJ INS; Expand-O-Flash.
    - f. MM Systems Corporation; Series ERJL.
  2. Polymeric Sheet: Manufacturer's standard.
  3. Metal Flanges: Zinc-coated (galvanized) steel, minimum 0.019 inch thick.
  4. Moisture Barrier: Manufacturer's standard, flexible, continuous, polymeric moisture barrier looped under roof expansion assemblies at locations indicated. Fill space with blanket-type, mineral-fiber insulation.
  5. Fire Barrier: Provide manufacturer's standard fire barrier.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for handling and installing roof expansion assemblies and materials unless more stringent requirements are indicated.

- B. Coordinate installation of roof expansion assembly materials and associated work so complete assemblies comply with assembly performance requirements.
- C. Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of roof expansion assembly, including transitions and end joints.
- D. Extend roof expansion assemblies over fasciae and other elements in the construction profile, with factory-fabricated intersections and transitions to provide continuous, uninterrupted, waterproof roof expansion assemblies.
- E. Splice roof expansion assemblies with materials provided by roof expansion assembly manufacturer for this purpose, according to manufacturer's written instructions, to provide continuous, uninterrupted, waterproof roof expansion assemblies.
- F. Provide uniform profile of roof expansion assembly throughout length of each installation; do not stretch polymeric sheets.
- G. Install mineral-fiber blanket insulation to fill joint space within joint and moisture barrier.
- H. Bed wall anchorage flanges in cement or sealant recommended by manufacturer and securely fasten to wall construction as recommended by manufacturer but not less than 6 inches o.c.
- I. On single-ply roofing, install roof expansion assemblies complying with manufacturer's written instructions. Anchor to cants or curbs and seal to membrane with sealant compatible with roofing membrane and roof expansion assembly. Cover flanges with stripping or flashing and install according to requirements in Division 7 Section "EPDM Membrane Roofing."

### 3.2 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that roof expansion assemblies are without damage or deterioration at time of Substantial Completion.

**END OF SECTION 07716**

**SECTION 07720 - ROOF ACCESSORIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Roof hatches.
  - 2. Hatch guardrails.
  - 3. Ladder extensions.
- B. Related Sections include the following:
  - 1. Division 5 Section "Metal Fabrications" for metal vertical ladders for access to roof hatches.
  - 2. Division 6 Section "Miscellaneous Carpentry" for wood nailers.
  - 3. Division 7 Section "EPDM Membrane Roofing" for roofing system.
  - 4. Division 7 Section "Manufactured Roof Specialties" for shop-fabricated metal flashing and counterflashing.

**1.3 SUBMITTALS**

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

**1.4 QUALITY ASSURANCE**

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
- B. NRCA's "Roofing and Waterproofing Manual" for details for installing units.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

**1.6 PROJECT CONDITIONS**

- A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

**1.7 COORDINATION**

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed in other Part 2 articles.

**2.2 METAL MATERIALS**

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated and mill phosphatized for field painting.

**2.3 MISCELLANEOUS MATERIALS**

- A. Glass-Fiber Board Insulation: ASTM C 726, 1 inch thick.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, 1 inch thick.



- C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.
- D. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- E. Polyethylene Sheet: 6-mil- thick, polyethylene sheet complying with ASTM D 4397.
- F. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
  - 1. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.
- G. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
- H. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- I. Elastomeric Sealant: ASTM C 920, polyurethane sealant; of type, grade, class, and use classifications required to seal joints in Manufactured Roof Specialties and remain watertight.
- J. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

## 2.4 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
  - 1. Manufacturers:
    - a. Babcock-Davis; a Cierra Products Inc. Company.
    - b. Bilco Company (The).
    - c. J. L. Industries, Inc.
    - d. Milcor Inc.; a Gibraltar Company.

- e. Wasco Products, Inc.
2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
  - a. Reinforce roof hatch to receive mounting for safety railing system and to transmit loads from railing system to roof framing system.
3. Type and Size: Single-leaf lid, 30 by 36 inches.
4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch thick.
  - a. Finish: Prime painted.
5. Insulation: Glass-fiber board.
6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
7. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
8. Hardware: Stainless-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
9. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
  - a. Test Load: concentrated load of 200 lb applied in any direction to the top of the safety post.
  - b. Height: 42 inches above finished roof deck.
  - c. Material and Finish: Steel tube, baked enameled.
  - d. Diameter: Pipe with 1-5/8-inch (minimum) OD tube or square tubing with same exterior dimension.
10. Safety Railing System: Manufacturer's complete system designed to mount to roof hatch, including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
  - a. Test Load: as required by the 2000 International Building Code with 2002 Amendments for guardrails.
  - b. Height: 42 inches above finished roof deck.
  - c. Pipe or Tube: 1-1/4-inch ID galvanized pipe or 1-5/8-inch OD galvanized tube.
  - d. Flat Bar: 2-inch- high by 3/8-inch- thick galvanized steel.
  - e. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
  - f. Pipe Ends and Tops: Covered or plugged with weather-resistant material.

- g. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- h. Fabricate joints that will be exposed to weather in a watertight manner.
- i. Close exposed ends of handrail and railing members with prefabricated end fittings.
- j. Fasteners: Manufacturer's standard.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
  - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
  - 2. Verify dimensions of roof openings for roof accessories.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
  - 1. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
  - 2. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Roof Hatch Installation:
  - 1. Set hatch on nailers so that bottom flange of hatch curb is level with top of roof membrane.
  - 2. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
  - 3. Attach safety railing system to roof hatch curb.
  - 4. Attach ladder safety post according to manufacturer's written instructions.
- F. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

### 3.3 TOUCH UP

- A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 9 painting Sections.

### 3.4 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.

**END OF SECTION 07720**

**SECTION 07841 - THROUGH-PENETRATION FIRESTOP SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.
- B. Related Sections include the following:
  - 1. Division 7 Section "Fire-Resistive Joint Systems."
  - 2. Division 13 Sections specifying fire-suppression piping penetrations.
  - 3. Division 15 Sections specifying duct and piping penetrations.
  - 4. Division 16 Sections specifying cable and conduit penetrations.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814:
  - 1. Ratings equaling or exceeding fire-resistance rating of constructions penetrated.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
  2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
- C. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
1. Types of penetrating items.
  2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
  3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- D. Qualification Data: For Installer.
- E. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.
- F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing through-penetration firestop systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful

performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
  - 2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
    - a. Through-penetration firestop system products bear classification marking of qualified testing and inspecting agency.
    - b. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
      - 1) UL in its "Fire Resistance Directory."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

## 1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by building inspector, if required by authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide through-penetration firestop systems of the type indicated for each application in the Through-Penetration Firestop System Schedule at the end of Part 3 that are produced by one of the following manufacturers:
  - 1. A/D Fire Protection Systems Inc.
  - 2. Grace, W. R. & Co. - Conn.
  - 3. Hilti, Inc.
  - 4. Johns Manville.
  - 5. Nelson Firestop Products.
  - 6. NUCO Inc.
  - 7. RectorSeal Corporation (The).
  - 8. Specified Technologies Inc.
  - 9. 3M; Fire Protection Products Division.
  - 10. Tremco; Sealant/Weatherproofing Division.
  - 11. USG Corporation.



## 2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.

## 2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- C. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

## 2.4 MIXING

- A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system manufacturer's written instructions and with the following requirements:
  1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of through-penetration firestop systems.
  2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. Remove loose particles remaining from cleaning operation.
- B. Priming: Prime substrates where recommended in writing by through-penetration firestop system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

### 3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for firestop systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

### 3.5 THROUGH-PENETRATION FIRESTOP SYSTEM TYPE SCHEDULE

- A. Provide Underwriters Laboratory (UL) listed firestop systems of the following types at the locations indicated.
- B. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
  - 1. Type of Fill Materials: One or more of the following:
    - a. Latex sealant.
    - b. Intumescent putty.
- C. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:
  - 1. Type of Fill Materials: One or more of the following:
    - a. Latex sealant.
    - b. Intumescent putty.
- D. Firestop Systems for Insulated Pipes:

1. Type of Fill Materials: One or more of the following:
  - a. Latex sealant.
  - b. Intumescent putty.
  
- E. Firestop Systems for Groupings of Penetrants:
  1. Type of Fill Materials: One or more of the following:
    - a. Latex sealant.

END OF SECTION 07841

**SECTION 07842 - FIRE-RESISTIVE JOINT SYSTEMS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes fire-resistive joint systems for the following:
  - 1. Wall-to-wall joints.
- B. Related Sections include the following:
  - 1. Division 5 Section "Architectural Joint Systems" for fire-resistive joint systems consisting of metal frames and flexible seals.
  - 2. Division 7 Section "Through-Penetration Firestop Systems" for systems installed in openings in walls and floors with and without penetrating items.
  - 3. Division 7 Section "Joint Sealants" for non-fire-resistive joint sealants.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.
- B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join.
- C. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
  - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
- C. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.
- D. Qualification Data: For Installer.
- E. Field quality-control test reports.
- F. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- B. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
  - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
  - 2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
    - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
    - b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

## 1.8 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include, but are not limited to, those systems indicated in the Fire-Resistive Joint System Schedule at the end of Part 3.

## 2.2 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears



from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

### 3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
  - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

### 3.5 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

- A. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG.

B. Wall-to-Wall Fire-Resistive Joint Systems **FRJS-1**:

1. Basis-of-Design: UL System # WW-D-1012.
2. Assembly Rating: 1 hour.
3. Joint Width: As indicated.
4. Movement Capabilities: Class II, 7-percent compression or extension.

**END OF SECTION 07842**

**SECTION 07920 - JOINT SEALANTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes joint sealants for the applications indicated in the Joint-Sealant Schedule at the end of Part 3, and also, including those specified by reference to this Section:
- B. Related Sections include the following:
  - 1. Division 2 Section "Pavement Joint Sealants" for sealing joints in pavements, walkways, and curbing.
  - 2. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.
  - 3. Division 7 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
  - 4. Division 7 Section "Through-Penetration Firestop Systems" for penetrations in fire-resistance-rated construction.
  - 5. Division 8 Section "Glazing" for glazing sealants.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

**1.4 SUBMITTALS**

- A. Product Data: For each joint-sealant product indicated.

- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in **1/2-inch**- wide joints formed between two **6-inch**- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. Qualification Data: For Installer.
- F. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- G. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- H. Warranties: Special warranties specified in this Section.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the Notice to Proceed with the Work.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
  - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

## 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  2. When joint substrates are wet.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

## 1.7 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: 10 years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  2. Disintegration of joint substrates from natural causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Products: Subject to compliance with requirements, provide one of the products listed.
  2. Basis-of-Design Product: The design for the sealant system is based on the product specified. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

### 2.2 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- D. **ES-1: (Not Used)**
- E. Single-Component Medium-Modulus Neutral-Curing Silicone Sealant **ES-2:**
1. Basis of Design Product:

- a. Dow Corning Corporation; 795. Subject to compliance with requirements, provide the named product or a comparable product by:
    - 1) GE Silicones.
    - 2) Pecora Corporation.
  2. Type and Grade: S (single component) and NS (nonsag).
  3. Class: 50.
  4. Use Related to Exposure: NT (nontraffic).
  5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and brick.
  6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
- F. Single-Component Nonsag Urethane Sealant **ES-3**:
1. Products:
    - a. Sika Corporation, Inc.; Sikaflex - 1a.
    - b. Degussa Building Systems; Sonolastic NP 1.
    - c. Tremco; Vulkem 116.
  2. Type and Grade: S (single component) and NS (nonsag).
  3. Class: 25.
  4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
  5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
- G. Multicomponent Pourable Urethane Sealant **ES-4**:
1. Products:
    - a. Bostik Findley; Chem-Calk 550.
    - b. Meadows, W. R., Inc.; POURTHANE.
    - c. Pacific Polymers, Inc.; Elasto-Thane 227 High Shore Type I (Self Leveling).
    - d. Pacific Polymers, Inc.; Elasto-Thane 227 Type I (Self Leveling).
    - e. Pecora Corporation; Urexpan NR-200.
    - f. Polymeric Systems Inc.; PSI-270SL.
    - g. Schnee-Morehead, Inc.; Permthane SM 7201.
    - h. Tremco; THC-901.
    - i. Tremco; THC-900.

- j. Tremco; Vulkem 245.
  - 2. Type and Grade: M (multicomponent) and P (pourable).
  - 3. Class: 25.
  - 4. Use Related to Exposure: T (traffic).
  - 5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
- H. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant **ES-5**:
- 1. Products:
    - a. Dow Corning Corporation; 786 Mildew Resistant.
    - b. GE Silicones; Sanitary SCS1700.
    - c. Tremco; Tremsil 200 White.
  - 2. Type and Grade: S (single component) and NS (nonsag).
  - 3. Class: 25.
  - 4. Use Related to Exposure: NT (nontraffic).
  - 5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
    - a. Use O Joint Substrates: ceramic tile and other Use O substrates as applicable.
  - 6. Joint-Sealant Application: Joints between plumbing fixtures and adjoining walls, floors, and counters.
  - 7. Joint-Sealant Color: White.

## 2.4 LATEX JOINT SEALANTS

- A. Latex Sealant **LS**: Comply with ASTM C 834, Type P, Grade NF.
- B. Products:
  - 1. Bostik Findley; Chem-Calk 600.
  - 2. Pecora Corporation; AC-20+.
  - 3. Schnee-Morehead, Inc.; SM 8200.
  - 4. Sonneborn, Division of ChemRex Inc.; Sonolac.
  - 5. Tremco; Tremflex 834.

## 2.5 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant **AS** for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and the following:



1. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
2. Products:
  - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
  - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.

## 2.6 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type 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.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to **minus 26 deg F**. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.7 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that 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), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.

- d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

## 3.6 JOINT-SEALANT SCHEDULE

JOINT SEALANT SCHEDULE		
JOINT SEALANT DESIGNATION	JOINT SEALERS	DESCRIPTION OF JOINT CONSTRUCTION AND LOCATION WHERE SEALANT IS TYPICALLY APPLIED*
ES-1		Not Used
ES-2	Single Component Medium Modulus Neutral Cure Silicone Sealant (for use where painting over the sealant is not required)	Exterior and interior joints in vertical surfaces of concrete and masonry; between metal and concrete or mortar; interior and exterior perimeter joints of metal frames in exterior walls; exterior overhead joints and all other exterior joints not indicated otherwise. Capable of $\pm 50\%$ joint movement.
ES-3	Single-Component Non-sag Urethane Sealant (for use where painting over the sealant is required)	Exterior and interior joints in vertical surfaces of concrete and masonry; between metal and concrete or mortar; interior and exterior perimeter joints of metal frames in exterior walls; exterior overhead joints and all other exterior joints not indicated otherwise. Capable of $\pm 25\%$ joint movement.
ES-4	Multi-Component Pourable Polyurethane Sealant	Interior horizontal joints in concrete paving and tile.
ES-5	Single Component Mildew-Resistant Silicone Sealant	Interior joints in toilet rooms, at plumbing fixtures and backsplashes, in kitchens and other wet areas.
LS	Acrylic-Emulsion Sealant	Interior joints in field-painted vertical and overhead surfaces at perimeter of hollow metal door frames; in gypsum drywall, concrete, and concrete masonry; and all other interior joints not indicated otherwise
AS	Acoustical Sealant	Interior joints in sound rated assemblies.
* Install sealant indicated in joints fitting descriptions and locations listed as well as in locations identified by Drawing designations in first column above.		

END OF SECTION 07920

**SECTION 08111 - STANDARD STEEL DOORS AND FRAMES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes standard hollow-metal steel doors and frames.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for building anchors into and grouting standard steel frames in masonry construction.
  - 2. Division 8 Section "Glazing" for glazed lites in standard steel doors.
  - 3. Division 8 Sections for door hardware for standard steel doors.
  - 4. Division 9 painting Sections for field painting standard steel doors and frames.

**1.3 DEFINITIONS**

- A. Minimum Thickness: Minimum thickness of base metal without coatings.

**1.4 SUBMITTALS**

- A. Product Data: Include construction details, material descriptions, core descriptions, label compliance, fire-resistance and temperature-rise ratings, and finishes for each type of steel door and frame specified.
- B. Shop Drawings: In addition to requirements below, provide a schedule of standard steel doors and frames using same reference numbers for details and openings as those on Drawings:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details.
  - 3. Frame details for each frame type, including dimensioned profiles.
  - 4. Details and locations of reinforcement and preparations for hardware.

5. Details of each different wall opening condition.
  6. Details of anchorages, accessories, joints, and connections.
  7. Details of glazing frames and stops showing glazing.
- C. Coordination Drawings: Drawings of each opening, including door and frame, drawn to scale and coordinating door hardware. Show elevations of each door design type, showing dimensions, locations of door hardware, and preparations.
- D. Qualification Data: For testing agency.
- E. Product Test Reports: Based on evaluation of comprehensive fire tests performed by a qualified testing agency, for each type of standard steel door and frame.

### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations: Obtain standard steel doors and frames through one source from a single manufacturer.
- C. Fire-Rated Door Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated.
1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
  2. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, the neutral pressure level in furnace shall be established at 40 inches or less above the sill.
  3. Temperature-Rise Rating: At exit enclosures, provide doors that have a temperature-rise rating of 450 deg F maximum in 30 minutes of fire exposure.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood

blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.

1. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify openings by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating standard steel frames without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

## 1.8 COORDINATION

- A. Coordinate installation of anchorages for standard steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete masonry. Deliver such items to Project site in time for installation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Amweld Building Products, LLC.
  2. Deansteel Manufacturing, Inc.
  3. Mesker Door Inc.
  4. Steelcraft; an Ingersoll-Rand Company.

### 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.



- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 zinc-iron-alloy (galvannealed) coating designation.
- D. Electrolytic Zinc-Coated Steel Sheet: ASTM A 591/A 591M, Commercial Steel (CS), Class B coating; mill phosphatized.
- E. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M.
- G. Grout: Comply with Division 4 Section "Unit Masonry Assemblies."
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 8 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

### 2.3 STANDARD STEEL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces, unless otherwise indicated. Comply with ANSI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard, polystyrene, polyurethane or mineral-board core that produces doors complying with ANSI A250.8.
    - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
    - b. Thermal-Rated (Insulated) Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
      - 1) Locations: All exterior and interior doors except those required to be fire-resistance rated.

3. Vertical Edges for Single-Acting Doors: Beveled edge.
  4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
  5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick end closures or channels of same material as face sheets.
  6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior door requirements. Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as door face sheets to comply with the following minimum sizes:
1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
  2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
  3. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.

## 2.4 STANDARD STEEL FRAMES

- A. General: Comply with ANSI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
  2. Frames for Level 3 Steel Doors: 0.053-inch thick except provide .067-inch thick frames for exterior toilet room doors.

- C. Interior Frames: Fabricated from cold-rolled steel sheet, unless otherwise indicated to comply with exterior frame requirements.
  - 1. Fabricate frames with mitered or coped and welded face corners and seamless face joints.
  - 2. Frames for Level 3 Steel Doors: 0.053-inch- thick steel sheet.
- D. Hardware Reinforcement: Fabricate reinforcement plates from same material as frames to comply with the following minimum sizes:
  - 1. Hinges: Minimum 0.123 inch thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by not less than 6 spot welds.
  - 2. Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick.
  - 3. All Other Surface-Mounted Hardware: Minimum 0.067 inch thick.
- E. Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.
- F. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- G. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
- H. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- I. Plaster Guards: Formed from same material as frames, not less than 0.016-inch thick.

## 2.5 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.

- B. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

## 2.6 FABRICATION

- A. General: Fabricate standard steel doors and frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Standard Steel Doors:
  - 1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
  - 2. Glazed Lites: Factory cut openings in doors and factory glaze.
- C. Standard Steel Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    - a. Provide closure plate welded to both sides of frame below louver sills
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners, unless otherwise indicated.
  - 3. Plaster Guards: Weld guards to frame at back of hardware mortises in frames installed in concrete or masonry.
  - 4. Where installed in masonry, leave vertical mullions in frames open at top for grouting.
  - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  - 6. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches in height.
      - 2) Three anchors per jamb from 60 to 90 inches in height.
    - b. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
  - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
  
- D. Hardware Preparation: Factory prepare standard steel doors and frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
  1. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
  2. Comply with applicable requirements in ANSI A250.6 and ANSI/DHI A115 Series specifications for door and frame preparation for hardware. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
  
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
  1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
  2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  3. Provide loose stops and moldings on inside of doors and frames.
  4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

## 2.7 STEEL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  1. Finish standard steel door and frames after assembly.
  
- B. Metallic-Coated Steel Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Steel Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel; comply with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than 0.7 mils.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Remove welded-in shipping spreaders installed at factory.
- B. Prior to installation and with installation spreaders in place, adjust and securely brace standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
  1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
  3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Provide doors and frames of sizes, thicknesses, and designs indicated. Install standard steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Standard Steel Frames: Install standard steel frames for doors and other openings, of size and profile indicated. Comply with SDI 105.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - f. Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - g. Apply bituminous coating to backs of frames that are filled with mortar, grout, and plaster containing antifreezing agents.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
  3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar as specified in Division 4 Section "Unit Masonry Assemblies."

4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  5. Installation Tolerances: Adjust standard steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Standard Steel Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
    - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
  2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
  3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with standard steel door and frame manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c., and not more than 2 inches o.c. from each corner.

### 3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including standard steel doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Clean grout and other bonding material off standard steel doors and frames immediately after installation.



- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- D. Galvanized Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

**END OF SECTION 08111**

**SECTION 08311 - ACCESS DOORS AND FRAMES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Access doors and frames for walls.
- B. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for anchoring and grouting access door frames set in masonry construction.
  - 2. Division 7 Section "Roof Accessories" for roof hatches.
  - 3. Division 15 Section "Duct Accessories" for heating and air-conditioning duct access doors.

**1.3 SUBMITTALS**

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain access door(s) and frame(s) through one source from a single manufacturer.
- B. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. NFPA 252 for vertical access doors and frames.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated on the Drawings.

#### 1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

### PART 2 - PRODUCTS

#### 2.1 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
  - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and

abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

- a. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
2. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.

## 2.2 ACCESS DOORS AND FRAMES FOR WALLS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Acudor Products, Inc.
  2. Babcock-Davis; A Cierra Products Co.
  3. Bar-Co, Inc. Div.; Alfab, Inc.
  4. Cendrex Inc.
  5. Dur-Red Products.
  6. Elmdor/Stoneman; Div. of Acorn Engineering Co.
  7. Jensen Industries.
  8. J. L. Industries, Inc.
  9. Karp Associates, Inc.
  10. Larsen's Manufacturing Company.
  11. MIFAB, Inc.
  12. Milcor Inc.
  13. Nystrom, Inc.
  14. Williams Bros. Corporation of America (The).
- B. Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet. Provide unit with extruded door gasket at exterior locations.
  1. Locations: Wall surfaces.
  2. Door: Minimum 0.060-inch- thick sheet metal, set flush with exposed face flange of frame.
  3. Frame: Minimum 0.060-inch- thick sheet metal with 1-1/4-inch- wide, surface-mounted trim.
  4. Hinges: Continuous piano.
  5. Lock: Cylinder.
- C. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from metallic-coated steel sheet. Provide unit with extruded door gasket at exterior locations.
  1. Locations: Wall surfaces.

2. Fire-Resistance Rating: Not less than that of adjacent construction.
3. Temperature Rise Rating: 250 deg F at the end of 30 minutes.
4. Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.036 inch.
5. Frame: Minimum 0.060-inch- thick sheet metal with 1-1/4-inch- wide, surface-mounted trim.
6. Hinges: Continuous piano.
7. Automatic Closer: Spring type.
8. Lock: Self-latching device with cylinder lock.

## 2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
  1. Exposed Flanges: As indicated.
  2. For units installed in precast concrete panels, provide mounting holes in frames for attachment of units to concrete.
  3. For units installed in masonry, provide mounting holes in frame for attachment of masonry anchors. Furnish adjustable metal masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
  1. For cylinder lock, furnish two keys per lock and key all locks alike.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

- C. Install doors flush with adjacent finish surfaces.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

**END OF SECTION 08311**

**SECTION 08712 - DOOR HARDWARE (SCHEDULED BY DESCRIBING PRODUCTS)****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Commercial door hardware for the following:
    - a. Swinging doors.
  - 2. Cylinders for doors specified in other Sections.
- B. Related Sections include the following:
  - 1. Division 8 Section "Standard Steel Doors and Frames" for door silencers provided as part of hollow-metal frames.
  - 2. Division 8 Section "Access Doors and Frames" for access door hardware.
  - 3. Division 8 Section "Glazed Aluminum curtain Walls" for entrance door hardware, except cylinders.
- C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
  - 1. Cylinders for locks specified in other Sections.
  - 2. Permanent cores to be installed by Owner.

**1.3 SUBMITTALS**

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware

sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.

1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Qualification Data: For Installer and Architectural Hardware Consultant.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches and closers.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- F. Warranty: Special warranty specified in this Section.
- G. Other Action Submittals:
1. Door Hardware Sets: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    - b. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, and material of each door and frame.
      - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
      - 3) Complete designations of every item required for each door or opening including name and manufacturer.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for door hardware.
      - 8) Door and frame sizes and materials.
      - 9) List of related door devices specified in other Sections for each door and frame.



- c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.
2. Keying Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
  1. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  2. Installer shall have warehousing facilities in Project's vicinity.
  3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- D. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
  1. Test Pressure: Test at atmospheric pressure unless otherwise required by the authorities having jurisdiction.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

**1.6 COORDINATION**

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

**1.7 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of operators and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  - 2. Warranty Period: Three years from date of Substantial Completion, except as follows:
    - a. Manual Closers: 10 years from date of Substantial Completion.

**1.8 MAINTENANCE SERVICE**

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

- B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door hardware operation. Provide parts and supplies same as those used in the manufacture and installation of original products.

## **PART 2 - PRODUCTS**

### **2.1 SCHEDULED DOOR HARDWARE**

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
  - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.
- C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### **2.2 HINGES, GENERAL**

- A. Quantity: Provide the following, unless otherwise indicated:
  - 1. Two Hinges: For doors with heights up to 60 inches.
  - 2. Three Hinges: For doors with heights 61 to 90 inches.
- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Base Metal: Unless otherwise indicated, provide the following:
  - 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
  - 2. Interior Hinges: Stainless steel, with stainless-steel pin.
  - 3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.

- D. Hinge Options: Where indicated in door hardware sets or on Drawings:
  - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed.
  - 2. Corners: Square.
- E. Fasteners: Comply with the following:

### 2.3 HINGES

- A. Butts and Hinges: Listed under Category A in BHMA's "Certified Product Directory."
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Basis-of-Design: The Specification is based upon product named below as Basis-of-Design products. Subject to requirements, provide either the named product or a comparable product by one of the following:
  - 1. Manufacturers:
    - a. Baldwin Hardware Corporation.
    - b. Lawrence Brothers, Inc.
    - c. McKinney Products Company; an ASSA ABLOY Group company.
    - d. Stanley Commercial Hardware; Div. of The Stanley Works.
    - e. H. B. Ives; an Ingersoll-Rand company.
- D. Antifriction-Bearing, Full-Mortise (Butt) Hinges: BHMA A156.1, heavy weight; Grade 1, with 4 ball bearings; button tips; nonrising nonremovable pins; and base metal as follows:
  - 1. Base Metal: Stainless steel.
  - 2. Basis-of-Design: Hager BB1199.
- E. Plain-Bearing, Standard-Weight, Full-Mortise (Butt) Hinges: BHMA A156.1, Grade 3, button tips, nonrising nonremovable pins, and base metal as follows:
  - 1. Base Metal: Stainless steel.
  - 2. Basis-of-Design: Hager 1191.

### 2.4 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Where indicated to comply with accessibility requirements, comply with ANSI A117.1 and FED-STD-795, "Uniform Federal Accessibility Standards."

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
  1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- D. Construction Keying: Comply with the following:
  1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
    - a. Replace construction cores with permanent cores as directed by Owner.
- E. Manufacturer: Same manufacturer as for locks and latches.
- F. Lock Trim:
  1. Levers: Forged or Cast.
  2. Escutcheons (Roses): Wrought, Forged or Cast.
  3. Dummy Trim: Match lever lock trim and escutcheons.
- G. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
  1. Bored Locks: Minimum 1/2-inch latchbolt throw.
  2. Deadbolts: Minimum 1-inch bolt throw.
- H. Backset: 2-3/4 inches, unless otherwise indicated.
- I. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
  1. Strikes for Bored Locks and Latches: BHMA A156.2.
  2. Strikes for Auxiliary Deadlocks: BHMA A156.5.

## 2.5 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:
  - 1. Bored Locks: BHMA A156.2.
- B. Bored Locks: BHMA A156.2, Grade 1; Series 4000. Listed under Category F in BHMA's "Certified Product Directory."
- C. Basis-of-Design: The Specification is based upon Schlage D Series with Omega lever handle. Subject to requirements, provide either the named product or a comparable product by one of the following:
  - 1. Manufacturers:
    - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
    - b. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
    - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    - d. Security Door Controls.
    - e. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company.

## 2.6 AUXILIARY LOCKS AND LATCHES

- A. Auxiliary Locks: BHMA A156.5, Grade 1. Listed under Category E in BHMA's "Certified Product Directory."
  - 1. Manufacturers:
    - a. Best Access Systems; Div. of The Stanley Works.
    - b. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
    - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    - d. Schlage Commercial Lock Division; an Ingersoll-Rand Company.
    - e. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company.
  - 2. Bored Auxiliary Locks:
    - a. Material: Brass or Stainless steel.
    - b. Deadlocks: Deadbolt operated by key outside and turn inside.
- B. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- C. Construction Keying: Comply with the following:
  1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
    - a. Replace construction cores with permanent cores as directed by Owner.
- D. Manufacturer: Same manufacturer as for locks and latches.

## 2.7 DOOR BOLTS, GENERAL

- A. Dustproof Strikes: BHMA A156.16, Grade 1.
- B. Surface Bolts: BHMA A156.16, Grade 1.
  1. Flush Bolt Heads: Minimum of 3/4-inch x 1/4-inch rods of stainless steel with minimum 12-inch-long rod.
  2. Basis-of-Design: The Specification is based upon H. B. Ives SB454 flush bolts. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following:
    - a. Manufacturers:
      - 1) Burns Manufacturing Incorporated.
      - 2) Don-Jo Mfg., Inc.
      - 3) Door Controls International.
      - 4) Glynn-Johnson; an Ingersoll-Rand Company.
      - 5) Hager Companies.
      - 6) Stanley Commercial Hardware; Div. of The Stanley Works.
      - 7) Trimco.

## 2.8 DOOR BOLTS

- A. Slide Flush Bolts: Stainless steel, with rod actuated by slide. Provide matching strike.
- B. Dustproof Strikes:
  1. Floor Type: Stainless steel, with spring-tension plunger sized to accept bolt.

## 2.9 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
  - 1. Master Key System: Cylinders are operated by a change key and a master key.
- B. Keys: Nickel silver.
  - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: "DO NOT DUPLICATE."
  - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
    - a. Cylinder Change Keys: Three.
    - b. Master Keys: Five.

## 2.10 ACCESSORIES FOR PAIRS OF DOORS

- A. Rigid, Housed Astragals: Gasket material held in place by metal housing; fastened to face of door with screws.
  - 1. Gasket Material: Neoprene or Silicone bulb.
  - 2. Housing Material: Aluminum.

## 2.11 CLOSERS, GENERAL

- A. Accessibility Requirements: Where handles, pulls, latches, locks, and other operating devices are indicated to comply with accessibility requirements, comply with ANSI A117.1 and FED-STD-795, "Uniform Federal Accessibility Standards."
  - 1. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
    - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf to set door in motion and not more than 15 lbf to open door to minimum required width.



- C. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- D. Surface Closers: BHMA A156.4, Grade 1. Listed under Category C in BHMA's "Certified Product Directory." Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
- E. Basis-of-Design: The Specification is based upon the 4020 Series closers manufactured by LCN Closers; an Ingersoll-Rand Company. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following:
  - 1. Manufacturers:
    - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
    - b. DORMA Architectural Hardware; Member of The DORMA Group North America.
    - c. Dor-O-Matic; an Ingersoll-Rand Company.
    - d. Norton Door Controls; an ASSA ABLOY Group company.
    - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
    - f. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
    - g. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company.

## 2.12 CLOSERS

- A. Modern-Type-with-Cover Surface Closers: Rack-and-pinion hydraulic type; with adjustable sweep and latch speeds controlled by key-operated valves; with forged-steel main arm; enclosed in cover indicated; complying with the following:
  - 1. Mounting: Parallel arm.
  - 2. Type: Regular arm.
  - 3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
  - 4. Cover Material: Aluminum or Plated steel.
  - 5. Closing Power Adjustment: At least 50 percent more than minimum tested value.

**2.13 PROTECTIVE TRIM UNITS, GENERAL**

- A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.
- B. Fasteners: Manufacturer's standard machine or self-tapping screws.
- C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:
  - 1. Material: 0.050-inch-thick stainless steel.
  - 2. Manufacturers:
    - a. Baldwin Hardware Corporation.
    - b. Burns Manufacturing Incorporated.
    - c. Don-Jo Mfg., Inc.
    - d. Hager Companies.
    - e. H. B. Ives Hardware; an Ingersoll-Rand Company.
    - f. Rockwood Manufacturing Company.

**2.14 PROTECTIVE TRIM UNITS**

- A. Armor Plates: 36 inches high by door width, with allowance for frame stops.
- B. Kick Plates: 12 inches high by door width, with allowance for frame stops.

**2.15 STOPS AND HOLDERS, GENERAL**

- A. Stops and Bumpers: BHMA A156.16, Grade 1.
  - 1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic.
- B. Mechanical Door Holders: BHMA A156.16, Grade 1.
- C. Manufacturers:
  - 1. Baldwin Hardware Corporation.
  - 2. Burns Manufacturing Incorporated.
  - 3. Don-Jo Mfg., Inc.
  - 4. Hager Companies.
  - 5. H. B. Ives Hardware; an Ingersoll-Rand Company.
  - 6. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
  - 7. Rockwood Manufacturing Company.
  - 8. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
  - 9. Stanley Commercial Hardware; Div. of The Stanley Works.

10. Trimco.

## 2.16 STOPS AND HOLDERS

- A. Wall Bumpers: Polished cast brass or aluminum with rubber bumper; 2-1/2-inch diameter, minimum 3/4-inch projection from wall, with backplate for concealed fastener installation; with convex bumper configuration.
- B. Dome-Type Floor Stops: Polished cast brass, or aluminum, with rubber bumper; and as follows:
  - 1. Height: Minimum 1 inch high, for doors without threshold; 1-3/8 inches high, for doors with threshold.
- C. Lever-Type Door Holders: Polished cast brass, bronze, or aluminum; minimum 4-inch-long arm that swings up and remains in vertical position; with replaceable rubber tip; surface-screw application.

## 2.17 DOOR GASKETING, GENERAL

- A. Standard: BHMA A156.22. Listed under Category J in BHMA's "Certified Product Directory."
- B. General: Provide continuous weather-strip gasketing or smoke gasketing as noted on exterior doors and provide smoke gasketing on interior doors where scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
  - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
  - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
  - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.
  - 1. Provide smoke-labeled gasketing on 20-minute-rated doors and on smoke-labeled doors.

- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
- G. Manufacturers:
  - 1. Hager Companies.
  - 2. M-D Building Products, Inc.
  - 3. National Guard Products.
  - 4. Pemko Manufacturing Co.
  - 5. Reese Enterprises.
  - 6. Sealeze; a Unit of Jason Incorporated.
  - 7. Zero International.

## 2.18 DOOR GASKETING

- A. Adhesive-Backed Perimeter Gasketing: Gasket material applied to frame rabbet with self-adhesive.
  - 1. Gasket Material: Neoprene bulb.
- B. Door Sweeps: Gasket material held in place by flat metal housing or flange; surface mounted to face of door with screws.
  - 1. Gasket Material: Neoprene.
  - 2. Housing Material: Aluminum.

## 2.19 THRESHOLDS, GENERAL

- A. Standard: BHMA A156.21. Listed under Category J in BHMA's "Certified Product Directory."
- B. Accessibility Requirements: Where thresholds are indicated to comply with accessibility requirements, comply with ANSI A117.1 and FED-STD-795, "Uniform Federal Accessibility Standards."
  - 1. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
- C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.

D. Basis-of-Design: The Specification is based upon National Guard Products #8425. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following:

1. Manufacturers:
  - a. Hager Companies.
  - b. M-D Building Products, Inc.
  - c. Pemko Manufacturing Co.
  - d. Reese Enterprises.
  - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
  - f. Sealeze; a Unit of Jason Incorporated.
  - g. Zero International.

## 2.20 THRESHOLDS

A. Saddle Thresholds: Type and base metal as follows:

1. Type: Thermal break and fluted top.
2. Base Metal: Aluminum or Stainless steel.

## 2.21 FABRICATION

- A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  2. Steel Machine Screws: For the following fire-rated applications:
    - a. Mortise hinges to doors.

- b. Strike plates to frames.
- c. Closers to doors and frames.

## 2.22 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. 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

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
  - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

- B. 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 work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

### 3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
  - 2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

## 3.6 DOOR HARDWARE SETS

Hardware Group No. 1 (Not Used)

Hardware Group No. 2 (Not Used)

Hardware Group No. 3 (Not Used)

Hardware Group No. 4 (Not Used)

## Hardware Group No. 5

Door #'s: 110, 111

Each door to have:

No.	Item	Description	Finish
3	Hinges	Antifriction-Bearing, Full Mortise	630
1	Lockset	Classroom Function, Means of Egress Door	US26D
1	Closer	Means of Egress Door	US26D
1	Protective Trim	Kickplate	630
1	Door Holder	Lever Type Door Holder	US26D
1	Set Gaskets	Weatherstripping	-
1	Bottom Seal	Door Bottom Seal with replaceable gasket	US28
1	Threshold	Saddle Threshold, Means of Egress Door	US28

## Hardware Group No. 6

Door #'s: 112

Each door to have:

No.	Item	Description	Finish
3	Hinges	Antifriction-Bearing, Full Mortise	630
1	Lockset	Storeroom Function	US26D
1	Closer	Interior fire door	US26D
1	Protective Trim	Armor plate	630
1	Door Holder	Lever Type Door Holder	US26D
1	Set Gaskets	Smoke Gaskets	-
1	Bottom Seal	Door Bottom Seal with replaceable gasket	US28

## Hardware Group No. 7

Door #'s: 113

Each door to have:

No.	Item	Description	Finish
6	Hinges	Plain-Bearing, Full Mortise	630
1	Lockset	Storeroom Function, on active leaf	US26D
2	Protective Trim	Kickplate	630
2	Door Holder	Lever Type Door Holder	US26D
1	Set Gaskets	Weatherstripping @ perimeter	-
1	Accessory	Astragal with gasket	US28



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2	Bottom Seal	Door Bottom Seal with replaceable gasket	US28
2	Door Bolts	Surface bolts on top and bottom of inactive leaf	US26D
1	Strike	Dustproof Strike at floor level	US26D
1	Threshold	Saddle Threshold	US28

**END OF SECTION 08712**

**SECTION 08800 - GLAZING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Glazing in hollow metal doors.
  - 2. Glazing in storefront assembled from curtain wall members.

**1.3 DEFINITIONS**

- A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
    - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
      - 1) Basic Wind Speed: 70mph
      - 2) Importance Factor: I.
      - 3) Exposure Category: C.
    - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
      - 1) Load Duration: 3 seconds.
    - c. Maximum Lateral Deflection: For the following types of glass supported on all 4 edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
      - 1) For insulating glass.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

## 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
  1. Each type of patterned glass.
  2. Coated vision glass.
  3. Insulating glass for each designation indicated.
  4. For each color (except black) of exposed glazing sealant indicated.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. Qualification Data: For installers.
- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: For each of the following types of glazing products:
  1. Coated float glass.
  2. Insulating glass.
  3. Glazing sealants.
- H. Warranties: Special warranties specified in this Section.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

- B. Source Limitations for Glass: Obtain the following through one source from a single manufacturer for each glass type: clear float glass, coated float glass patterned glass and insulating glass.
- C. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.
- D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
  - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
  - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
  - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- F. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:
  - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
  - 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.

- G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.
1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
  2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- H. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: GANA's "Glazing Manual."
  2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturer's written recommendations for venting and sealing to avoid hermetic seal ruptures.

## 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing

material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

## 1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form, made out to Owner and signed by insulating-glass manufacturer agreeing to replace insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.

1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Products: Subject to compliance with requirements, provide one of the products specified.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
  3. Basis-of-Design Product: The design for each glazing product is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

## 2.2 GLASS PRODUCTS

- A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
  - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
  - 2. For uncoated glass, comply with requirements for Condition A.
  - 3. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
- B. Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating applied by pyrolytic or vacuum deposition process during initial manufacture and heat treatment (if any), and complying with other requirements specified.
- C. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
- D. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
  - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
  - 2. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
  - 3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
  - 4. Sealing System: Dual seal, with primary and secondary sealants as follows:
    - a. Manufacturer's standard sealants.
  - 5. Spacer Specifications: Manufacturer's standard spacer material and construction.

## 2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer



indicated below, and of profile and hardness required to maintain watertight seal:

1. EPDM, ASTM C 864.
2. Silicone, ASTM C 1115.
3. Thermoplastic polyolefin rubber, ASTM C 1115.
4. Any material indicated above.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:

1. EPDM.
2. Silicone.
3. Thermoplastic polyolefin rubber.
4. Any material indicated above.

## 2.4 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

1. Single-Component Neutral-Curing Silicone Glazing Sealants:

a. Available Products:

- 1) Dow Corning Corporation; 790.
- 2) GE Silicones; SilPruf LM SCS2700.
- 3) Tremco; Spectrem 1 (Basic).

b. Type and Grade: S (single component) and NS (nonsag).

- c. Class: 100/50.
- d. Use Related to Exposure: NT (nontraffic).
- e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
- f. Applications: Typical glazing sealant unless otherwise recommended in writing by glazing manufacturer.

## 2.5 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
  - 1. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

## 2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

## 2.8 MONOLITHIC PATTERNED-GLASS UNITS

- A. Tempered Patterned-Glass Units: Quality-Q 6, Finish F 1 (patterned one side), Pattern P 3 (random), 6.0 mm thick.
  - 1. Basis-of-Design Product: Pilkington Building Products North America; Contora or a comparable product by one of the following:
    - a. AFG Industries Inc.

## 2.9 INSULATING-GLASS UNITS

- A. Reflective Insulating-Glass Units:
  - 1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
  - 2. Interspace Content: Argon.
  - 3. Outdoor Lite: Class 1 (clear) float glass with reflective coating.
    - a. Basis-of-Design Product: Viracon Solarscreen VS1- 20 or a comparable product by one of the following:
      - 1) Pilkington Building Products North America.
      - 2) AFG Industries Inc.
    - b. Kind FT (fully tempered).
  - 4. Indoor Lite: Tempered Patterned-Glass Units: Quality-Q 6, Finish F 1 (patterned one side), Pattern P 3 (random), 6.0 mm thick.
    - a. Basis-of-Design Product: Pilkington Building Products North America; Contora or a comparable product by one of the following:
      - 1) AFG Industries Inc.
      - 2) Kind FT (fully tempered).

5. Reflective Coating: Pyrolytic or Sputtered, as recommended by the manufacturer for the application.
  - a. Color: Stainless steel.
  - b. Location: Second surface.
  - c. Visible Light Transmittance: 18 percent minimum.
  - d. Outdoor Visible Reflectance: 24 percent maximum.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine framing glazing, with Installer present, for compliance with the following:
  1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  2. Presence and functioning of weep system.
  3. Minimum required face or edge clearances.
  4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 PREPARATION**

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

### **3.3 GLAZING, GENERAL**

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches as follows:
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

**3.7 CLEANING AND PROTECTION**

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

**END OF SECTION 08800**

**SECTION 08910 - GLAZED ALUMINUM CURTAIN WALLS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes:
  - 1. Conventionally glazed aluminum curtain walls installed as stick or unitized systems.
  - 2. Storefront and related fixed glazing (fabricated from curtain wall sections).
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
  - 2. Division 8 Section "Glazing" for insulating-glass requirements.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
  - 1. Structural loads.
  - 2. Thermal movements.
  - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 4. Dimensional tolerances of building frame and other adjacent construction.
  - 5. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Thermal stresses transferred to building structure.



- c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
  - d. Noise or vibration created by wind and thermal and structural movements.
  - e. Loosening or weakening of fasteners, attachments, and other components.
  - f. Sealant failure.
- B. Structural Loads:
1. Wind Loads: As indicated on Drawings.
  2. Seismic Loads: As indicated on Drawings.
- C. Structural-Test Performance: Provide glazed aluminum curtain-wall systems tested according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Duration: As required by design wind velocity but not less than 60 seconds.
- D. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to  $1/175$  of clear span for spans up to 13 feet 6 inches, and to  $1/240$  of clear span plus  $1/4$  inch, for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to  $3/4$  inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to  $1/360$  of clear span or  $1/8$  inch, whichever is smaller.
  3. Cantilever Deflection: Where framing members overhang an anchor point, limited to 2 times the length of cantilevered member, divided by 175.
- E. Thermal Movements: Provide glazed aluminum curtain-wall systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
  2. Test Performance: No buckling, stress on glass, glazing-edge seal failure, sealant failure, excess stress on curtain-wall framing, anchors and

fasteners, or reduction of performance when tested according to AAMA 501.5.

- a. Test High Exterior Ambient Air Temperature: That which produces an exterior metal surface temperature of 180 deg F.
  - b. Test Low Exterior Ambient Air Temperature: 0 deg F.
- F. Air Infiltration: Provide glazed aluminum curtain-wall systems with maximum air leakage of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.
- G. Water Penetration Under Static Pressure: Provide aluminum glazed curtain-wall systems that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 20 percent of positive design wind load, but not less than 15 lbf/sq. ft.
- H. Average Thermal Conductance: Provide glazed aluminum curtain-wall systems with average U-factor of not more than 0.66 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

#### 1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
1. Include structural analysis data signed and sealed by the qualified professional engineer registered in the state of Illinois responsible for their preparation.
- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery.
  2. Anchorage.
  3. Expansion provisions.
  4. Glazing.
  5. Flashing and drainage.

- E. Welding certificates.
- F. Qualification Data: For Installer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazed aluminum curtain-wall systems.
- H. Field quality-control test reports.
- I. Warranties: Special warranties specified in this Section.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
  - 1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
    - a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to glazed aluminum curtain-wall systems including, but not limited to, the following:

1. Review structural load limitations.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain-wall systems by field measurements before fabrication and indicate measurements on Shop Drawings.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain-wall systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.7 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration caused by thermal movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water leakage.
    - e. Failure of operating components to function normally.
  2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: 20 years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Basis-of-Design Product: The design for glazed aluminum curtain-wall systems is based on EFCO Corporation Series 5600 Outside Glazed Curtain Wall System, with 5-inch depth. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Kawneer.
  2. Tubelite, Inc.
  3. Vistawall Architectural Products.

**2.2 FRAMING SYSTEMS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
  2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
  3. Extruded Structural Pipe and Tubes: ASTM B 429.
  4. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
  2. Reinforce members as required to receive fastener threads.
  3. Use exposed fasteners with countersunk Phillips screw heads.
  4. Finish exposed portions to match framing system.
  5. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
- D. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
- E. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.

- F. Exposed Flashing: Fabricated from sheet aluminum, 0.040-inches thick, to profiles and dimensions indicated on the Drawings. Finish flashing to match framing color.
- G. Framing Gaskets: As recommended by manufacturer for joint type.
- H. Framing Sealants: As recommended by manufacturer for joint type.

### 2.3 GLAZING SYSTEMS

- A. Glazing: As specified in Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

### 2.4 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

### 2.5 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
  - 1. Sharp profiles, straight and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
  - 4. Physical and thermal isolation of glazing from framing members.
  - 5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
  - 6. Provisions for reglazing from exterior.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
  2. Seal joints watertight, unless otherwise indicated.
  3. Pressure equalize system at its interior face.
  4. Install glazing to comply with requirements in Division 8 Section "Glazing."
- E. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.6 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General:
1. Comply with manufacturer's written instructions.
  2. Do not install damaged components.
  3. Fit joints to produce hairline joints free of burrs and distortion.
  4. Rigidly secure nonmovement joints.
  5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

7. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
  2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified Division 8 Section "Glazing."
- F. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or greater, limit offset from true alignment to 1/4 inch.
  4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.3 CLEANING AND PROTECTION

- A. Protect curtain walls and glazing from damage during the balance of the construction period.
- B. Clean curtain wall, entrances and glazing immediately prior to Substantial Completion.

END OF SECTION 08911



**SECTION 09850 - ACOUSTICAL CEILING PANELS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes: Directly attached cementitious wood fiber plank acoustical ceiling panel system, wood trim and installation accessories.

**1.3 REFERENCES**

- A. ASTM International:
  - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E1264 Standard Classification for Acoustical Ceiling Products.

**1.4 SUBMITTALS**

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Product Test Reports: From a qualified testing agency indicating acoustical ceiling panels comply with requirements, based on comprehensive testing of current products.
- E. Samples: Submit selection and verification samples: 6 inch × 6 inch sample for each ceiling panel unit required, showing full range of exposed texture to be expected in completed work.

- F. Maintenance Data: Recommended procedures for normal cleaning and removal of stains including precautions in use of cleaning materials that may be detrimental to surfaces.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing acoustical ceiling panels similar to those indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Acoustical Ceiling Panels: Obtain acoustical ceiling panels from one source with resources to provide products of consistent quality in appearance and physical properties.
- C. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity.
- D. Product Performance Requirements:
  - 1. Provide acoustical ceiling panel assembly designed and tested to provide surface burning characteristics (ASTM E84) as follows:
    - a. Flamespread: 0.
    - b. Smoke Developed: 0.
  - 2. Provide acoustical ceiling panel system which has been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating as follows:
    - a. 1.05

## 1.6 DELIVERY, STORAGE & HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
  - 1. Prevent soiling, physical damage or wetting.
  - 2. Store cartons open at each end to stabilize moisture content and temperature.

## 1.7 PROJECT/SITE CONDITIONS

- A. Environmental Requirements:

1. Do not install acoustical panels until building is closed in and HVAC system is operational.
  2. Locate materials onsite at least 24 hours before beginning installation to allow materials to reach temperature and moisture content equilibrium.
  3. Maintain the following conditions in areas where acoustical materials are to be installed 24 hours before, during and after installation:
    - a. Relative Humidity: 65 - 75%.
    - b. Uniform Temperature: 55 - 70 degrees F.
- B. Field Measurements: Verify ceiling surface dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## PART 2 - PRODUCTS

### 2.1 ACOUSTICAL CEILING PANEL SYSTEM

- A. Manufacturer:
1. Basis-of-Design: This Specification is based upon Cementitious Wood Fiber Panels produced by Tectum, Inc., 105 South Sixth Street, Newark, OH 43055; Telephone: (888) 977-9691, (740) 345-9691; Fax: (800) 832-8869; E-mail: [info@tectum.com](mailto:info@tectum.com); website: [www.tectum.com](http://www.tectum.com). Similar products, in the opinion of the Architect, may be considered equivalent provided:
    - a. The manufacturer has been continuously manufacturing the proposed product for a period of at least 10 years.
    - b. The proposed product has a record of successful performance in similar applications for a period of at least 10 years.
    - c. The proposed product is identical in appearance to the specified product
    - d. The proposed product meets the requirements of this Specification.
  2. Submit data supporting a claim of equivalency prior to the date of receipt of bids. Approval will be in the form of an Addendum. Substitutions submitted after the receipt of bids will be rejected.

### 2.2 ACOUSTICAL CEILING PANEL SYSTEMS

- A. Acoustical ceiling panel:
1. Face Material: Aspen wood fibers bonded with inorganic hydraulic cement.

2. Thickness: 1-1/2-inch board + 2 inch furring with 2.25 lb density fiberglass between furring.
3. Width: 23¾ inches.
4. Color: Factory painted white.
5. Mounting Style: Attached to suitable substrate with continuous splines.

B. ACCESSORIES

1. Mounting splines: manufacturer's recommended metal concealed spline.
2. Touch-Up Paint:
  - a. Color: White, to match panel color.
3. Wood trim: Softwood species, clear of knots and surface irregularities that would interfere with obtaining a smooth painted finish.

### PART 3 - EXECUTION

#### 3.1 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the acoustical ceiling panel system manufacturer.
- B. Install materials in accordance with governing regulations, fire resistance rating requirements and industry standards applicable to work.

#### 3.2 EXAMINATION

- A. Site Verification of Conditions:
  1. Examine surfaces scheduled to receive attached acoustical units for unevenness, irregularities and dampness that would affect quality and execution of work.
  2. Do not proceed with installation of ceiling panel system until unacceptable conditions are corrected.

#### 3.3 INSTALLATION

- A. Install treated wood 2x4 furring spaced at 24-inches o.c. on precast concrete roof/ceiling panels with toggle bolts spaced at 24-inches o.c. Do not cut prestressing tendons in precast concrete members.

- B. Securely affix ceiling panels by means of splines attached to furring strips at 24-inches o.c. maximum. Engage kerfs on the edges of the ceiling panels with splines. Apply adhesive where necessary.
- C. Cover field cut edges by means of painted wood trim.

**3.4 CLEANING**

- A. Clean exposed surfaces of acoustical panel, trim and moldings to comply with manufacturer's instructions for cleaning.
- B. Touch up any minor finish damage.
- C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

**3.5 PROTECTION**

- A. Protect installed work from damage due to subsequent construction activity, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance by the Owner.

**END OF SECTION 09850**

**SECTION 09912 - PAINTING (PROFESSIONAL LINE PRODUCTS)****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes surface preparation and field painting of exposed interior items and surfaces as follows:
  - 1. Interior wood trim.
- B. Related Sections include the following:
  - 1. Division 9 Section "Concrete Floor Stain" for stain to be applied to concrete floors.
  - 2. Division 9 Section "High-Performance Coatings" for special coatings.

**1.3 DEFINITIONS**

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
  - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
  - 2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
  - 3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
  - 4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

**1.4 SUBMITTALS**

- A. Product Data: For each paint system indicated.
  - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and

- application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
- B. Samples for Initial Selection: For each type of finish-coat material indicated.
1. After color selection, Architect will furnish color chips for surfaces to be coated.
- C. Qualification Data: For Applicator.

### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Source Limitations: Obtain primers and finish coats from the same manufacturer.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
  8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

## 1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.
- B. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:
  - 1. Benjamin Moore & Co. (Benjamin Moore).
  - 2. ICI Dulux Paint Centers (ICI Dulux Paints).
  - 3. M. A. Bruder & Sons, Inc. (M. A. B. Paint).
  - 4. PPG Industries, Inc. (Pittsburgh Paints).
  - 5. Sherwin-Williams Co. (Sherwin-Williams).

### 2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
  - 1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products



named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

### 2.3 INTERIOR PRIMERS

- A. Interior Wood Primer for Semigloss Alkyd-Enamel Finish: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
1. Kelly-Moore; 985 Flo-Cote Alkyd Enamel Undercoat: Applied at a dry film thickness of not less than **1.9 mils**.
  2. Benjamin Moore; Moore's Alkyd Enamel Underbody No. 217: Applied at a dry film thickness of not less than **1.4 mils**.
  3. ICI Dulux Paints; 1000-1200 Dulux Ultra Basecoat Interior Latex Wall Primer: Applied at a dry film thickness of not less than **1.2 mils**.
  4. M. A. B. Paint; Rich Lux Latex Undercoat 037-154: Applied at a dry film thickness of not less than **1.5 mils**.
  5. Pittsburgh Paints; 6-855 SpeedHide Latex Enamel Undercoater: Applied at a dry film thickness of not less than **1.0 mil**.
  6. Sherwin-Williams; PrepRite Classic Interior Primer B28W101 Series: Applied at a dry film thickness of not less than **1.6 mils**.

### 2.4 INTERIOR FINISH COATS

- A. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.
1. Benjamin Moore; Moorcraft Super Spec Alkyd Semi-Gloss Enamel No. 271: Applied at a dry film thickness of not less than **1.4 mils**.
  2. ICI Dulux Paints; 1516-XXXX Ultra-Hide Alkyd Semi-Gloss Interior Wall & Trim Enamel: Applied at a dry film thickness of not less than **1.7 mils**.
  3. M. A. B. Paint; Fresh Kote Semi-Gloss 403 Line: Applied at a dry film thickness of not less than **2.0 mils**.
  4. Pittsburgh Paints; 6-1110 Series SpeedHide Interior Enamel Wall & Trim Semi-Gloss Oil: Applied at a dry film thickness of not less than **1.4 mils**.
  5. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss Enamel B34W200 Series: Applied at a dry film thickness of not less than **1.7 mils**.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application.

1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.

### 3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
  2. Wood Substrates:
    - a. Scrape and clean knots, and apply coat of knot sealer before applying primer.
    - b. Sand surfaces that will be exposed to view, and dust off.
    - c. Prime edges, ends, faces, undersides, and backsides of wood.
    - d. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
  2. Provide finish coats that are compatible with primers used.
  3. Sand lightly between each succeeding enamel or varnish coat.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
  2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
  3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush according to manufacturer's written instructions.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

- E. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- F. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- G. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

### 3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
  - 1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
  - 2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
  - 3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

### 3.5 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
  - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

**3.6 PROTECTION**

- A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

**END OF SECTION 09912**

**SECTION 09960 - HIGH-PERFORMANCE COATINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
  - 1. Exterior Substrates:
    - a. Precast and Cast-in-Place Concrete, vertical and horizontal surfaces without integral color.
    - b. Concrete masonry units (CMU).
    - c. Galvanized metal.
  - 2. Interior Substrates:
    - a. Concrete masonry units (CMU).
    - b. Steel.
    - c. Galvanized metal.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
  - 1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
  - 1. Prefinished items include the following factory-finished components:

- a. Finished mechanical and electrical equipment.
  - b. Light fixtures.
2. Finished metal surfaces include the following:
    - a. Anodized aluminum.
    - b. Stainless steel.
    - c. Chromium plate.
    - d. Copper and copper alloys.
    - e. Bronze and brass.
  3. Operating parts include moving parts of operating equipment and the following:
    - a. Valve and damper operators.
    - b. Linkages.
    - c. Sensing devices.
    - d. Motor and fan shafts.
  4. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

### 1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
  1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
  2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
  3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
  4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

### 1.4 SUBMITTALS

- A. Product Data: For each coating system indicated. Include primers.
  1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
- B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate.
1. Provide stepped Samples defining each separate coat, including primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
  2. List of material and application for each coat of each sample. Label each sample for location and application.

### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator approved by the coating manufacturer who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
1. Name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
  8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Protect materials from freezing.
  2. Keep storage area neat and orderly.



3. Remove oily rags and waste daily.
4. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

## 1.7 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
  2. Verify by adhesion proof testing, that precast concrete surfaces which receive epoxy finish are not treated with curing agent or other sealers detrimental to adhesion of epoxy finishes. Do not proceed with coatings until adhesion proof test has been completed.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for high performance coating systems is based upon products manufactured by Tnemec Company, Inc. (Tnemec) Subject to compliance with requirements, provide either the named product or a comparable product by one of the following:
  1. Carboline Company (Carboline).
  2. DuPont Company, High Performance Coatings (DuPont).

### 2.2 COATINGS MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.

- C. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that have a VOC classification of 450 g/L or less.

### 2.3 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS

- A. Exterior Precast Concrete Soffits: Two coats modified epoxy.
  - 1. Surface Preparation: Clean and dry.
  - 2. Two Finish Coats: Tneme-Crete Series 52, DFT 8.0 to 10.0 mils per coat.
  - 3. Finish: Flat with sand texture.
  - 4. Color: As selected by the Architect from them manufacturer's full range of standard colors.
- B. Exterior CMU Walls: Two coats modified epoxy.
  - 1. Surface Preparation: Clean and dry.
  - 2. Two Finish Coats: Tneme-Crete Series 55, DFT 8.0 to 10.0 mils per coat.
  - 3. Finish: Flat.
  - 4. Color: As selected by the Architect from the manufacturer's full range of standard colors.
- C. Exterior Galvanized Metal: Two coats aliphatic acrylic polyurethane over primer with clear topcoat.
  - 1. Surface Preparation: Chemically clean using Oakite CrysCoat 747 LTS per manufactures recommendations.
  - 2. Primer: Series 66 Hi-Build Epoxoline, DFT 2.0 to 3.0 mils.
  - 3. Topcoat: Series 1075 Endura-Shield II, DFT 2.0 to 3.0.
  - 4. Color: As selected by the Architect from the manufacturer's full range of standard colors.

### 2.4 INTERIOR HIGH-PERFORMANCE COATING SYSTEMS

- A. Interior CMU Walls: Two coats modified polyamine epoxy over block filler.
  - 1. Surface Preparation: Clean and dry.
  - 2. Block Filler: Series 130 Envirofill.
  - 3. Primer: Series 280 Tneme-Glaze, DFT 6.0 to 8.0 mils.
  - 4. Finish Coat: Series 280 Tneme-Glaze, DFT 6.0 to 8.0 mils.
  - 5. Finish: Gloss.
  - 6. Color: As selected by Architect from manufacturer's full range of standard colors.
- B. Interior Precast Walls: Two coats modified polyamine epoxy over primer.

1. Surface Preparation: Abrasive blast to SSPC-SP 13/NACE 6.
  2. Primer: Series 201 Epoxoprime, DFT 4.0 to 6.0 mils.
  3. Primer: Series 280 Tneme-Glaze, DFT 6.0 to 8.0 mils.
  4. Finish Coat: Series 280 Tneme-Glaze, DFT 6.0 to 8.0 mils.
  5. Finish: Gloss.
  6. Color: As selected by Architect from manufacturer's full range of standard colors.
- C. Interior Precast Concrete Roof/Ceiling: Two coats modified epoxy.
1. Surface Preparation: Clean and dry.
  2. Two Finish Coats: Tneme-Crete Series 52, DFT 8.0 to 10.0 mils per coat.
  3. Finish: Flat with sand texture.
  4. Color: As selected by the Architect from them manufacturer's full range of standard colors.
- D. Interior Galvanized Metal Ductwork:
1. Surface Preparation: Chemically clean using Oakite CrysCoat 747 LTS per manufactures recommendations.
  2. Primer: Series 66 Hi-Build Epoxoline, DFT 2.0 to 3.0 mils.
  3. Finish Coat: Series 66 Hi-Build Epoxoline, DFT 2.0 to 3.0 mils.
  4. Finish: Satin.
  5. Color: As selected by Architect from manufacturer's full range of standard colors.
- E. Interior Ferrous Metal: Mio Zinc-Filled Primer, epoxy intermediate and polyurethane finish.
1. Surface Preparation: SSPC-SP6 "Commercial Blast Cleaning".
  2. Primer: Series 394 PerimePrime , DFT 2.5 to 3.5 mils.
  3. Intermediate: Series 66 Hi-Build Epoxoline, DFT 2.0 to 3.0 mils.
  4. Topcoat: Series 1075 Endura-Shield II, DFT 2.0 to 3.0.
  5. Color: As selected by the Architect from the manufacturer's full range of standard colors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.

1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
  2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.
1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
    - a. Confirmation of primer's suitability for expected service conditions.
    - b. Confirmation of primer's ability to be top coated with materials specified.
  2. Notify Architect about anticipated problems before using the coatings specified over substrates primed by others.

### 3.2 PREPARATION

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.
1. Galvanized ("Paintgrip") Metal Surfaces: Clean and chemically etch following coating manufacturers recommendations.

2. CMU substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
1. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning" unless otherwise noted.
- E. Steel Substrates: Remove rust and loose mill scale.
1. Clean using methods recommended in writing by coating manufacturer.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- G. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
  2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
  3. Use only the type of thinners approved by manufacturer and only within recommended limits.

### 3.3 APPLICATION

- A. General: Apply high-performance coatings according to manufacturer's written instructions.
1. Use applicators and techniques best suited for the material being applied.
  2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
  3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
  4. Provide finish coats compatible with primers used.
  5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, grilles, covers for finned-tube radiation,

and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

- a. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
  - b. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Scheduling Coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required is the same regardless of application method.
    - a. Omit primer on metal surfaces that have been shop primed and touchup painted provided that topcoat and primer compatibility has been approved by topcoat manufacturer.
    - b. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
    - c. Where manufacturer's written instructions require sanding, sand between applications to produce a smooth, even surface.
    - d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.
  2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.
- C. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brush Application: Use brushes best suited for material applied and of appropriate size for the surface or item being coated.
    - a. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
    - b. Brush out and work brush coats into surfaces in an even film.

- c. Eliminate cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Neatly draw glass lines and color breaks.
  2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by manufacturer for the material and texture required.
  3. Spray Equipment: Use mechanical methods to apply coating if permitted by manufacturer's written instructions and governing regulations.
    - a. Use spray equipment with orifice size recommended by manufacturer for material and texture required.
    - b. Apply each coat to provide the equivalent hiding of brush-applied coats.
    - c. Do not double back with spray equipment building-up film thickness of two coats in one pass, unless recommended by manufacturer.
- D. Minimum Coating Thickness: Apply each material no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.
  1. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.
- F. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

### 3.4 FIELD QUALITY CONTROL

- A. Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coatings are being applied:
  1. Owner will engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  2. Testing agency will perform appropriate tests for the following characteristics as required by Owner:
    - a. Quantitative materials analysis.
    - b. Absorption.

- c. Accelerated weathering.
  - d. Accelerated yellowness.
  - e. Color retention.
  - f. Alkali and mildew resistance.
  - g. Abrasion resistance.
  - h. Apparent reflectivity.
  - i. Washability.
  - j. Dry opacity.
  - k. Recoating.
  - l. Skinning.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the two coatings are not compatible.

### 3.5 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

### 3.6 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
  2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09960



**SECTION 09962 - WATER REPELLENT AND GRAFFITI RESISTANT COATINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes penetrating water-repellent and graffiti resistant coatings for the following vertical surfaces:
  - 1. Cast-in-place concrete surfaces that will be exposed to view and which will not receive any other coating.
  - 2. Precast concrete surfaces that will be exposed to view and which will not receive any other coating.
- B. Related Sections include the following:
  - 1. Division 3 Section "Concrete & Reinforcing" for curing compounds, curing and sealing compounds, and penetrating liquid floor treatments.
  - 2. Division 7 Section "Joint Sealants" for joint sealants for use in precast and cast-in-place concrete construction.
  - 3. Division 9 Section "Painting" for paints and other coatings to be used on concrete.

**1.3 SUBMITTALS**

- 1. Product Specification Data: Submit manufacturer's technical literature, specifications, and application instructions for the specified clear water repellent and graffiti resistant material.
  - 2. Include manufacturer's printed statement of VOC content.
  - 3. Manufacturer Certificates: Signed by manufacturer certifying that water repellent and graffiti resistant coating complies with requirements.
- B. Qualification Data: For Installer.
    - 1. Applicator Qualifications: Submit certification stating applicator has a minimum of three (3) years experience using the specified product.

Provide a list of several most recently completed projects where the specified material was used. Include the project name, location, architect and method of application.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.
- D. Warranty: Special warranty specified in this Section.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer: A firm with no less than ten (10) years experience in manufacturing the products specified in this section.
- B. Applicator Qualification: A firm with no less than three (3) years experience in the application of the products specified in this section. In addition, applicator must state the intended use of the proper application equipment and that it has been well maintained.
- C. Mock-Up:
  - 1. Locate each test application as directed by the Architect.
    - a. Size: 25 sq. ft.
  - 2. Apply anti-graffiti per manufacturer's application instructions as directed by the Architect to substrate material that matches actual job conditions. Determine the acceptability of appearance and optimum coverage rate required for application.
  - 3. After sample treatment has cured in accordance with manufacturers recommendations, graffiti test to verify that substrate is coated with sufficient graffiti-repellent to effectively repel graffiti from the surface. Allow a minimum of 5 days curing time prior to applying graffiti to test panels. Apply cleaner to evaluate ease of graffiti removal, repeat cycles as directed by Architect.
  - 4. Obtain Architect and/or Project Owner approval prior to full scale application of water repellent and graffiti resistants.
- D. Pre-Application Meeting: Convene a pre-application meeting prior to the start of application of the specified material. Attendance by a representative of each of the following organizations is requested; the application firm, the architectural firm, and the water repellent and graffiti resistant manufacturer. Notify each of the attendees at least three (3) days prior to the meeting time.

**1.5 PRODUCT DELIVERY**

- A. Material Delivery: Deliver materials to the job site in original sealed containers, clearly marked with manufacturer's name, brand name, and type of material. Verify the product matches that of the original sample applied on the mock-up wall.
- B. Record Keeping: Contractor / applicator shall record product batch number or lot number for warranty purposes.
- C. Storage & Protection: Store materials inside if possible, away from sparks and open flame. Store in a secure area to avoid tampering and contamination. Water based materials must be kept from freezing. Store and handle in accordance with manufactures written instructions.

**1.6 PROJECT CONDITIONS**

- A. Surface Preparation: Surface must be free of cracks, dirt, oils, paint or other contaminants which may affect the appearance or performance of the water repellent and graffiti resistant material.
- B. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellent and graffiti resistant coatings to be applied according to manufacturers' written instructions and warranty requirements:
  - 1. Air and substrate temperature must be above 40° F ( 4° C) or below 100° F ( 38° C) unless otherwise specified by manufacturer.
  - 2. Do not proceed with application if the substrate is wet or contains frozen water.
  - 3. Do not apply material when rain is predicted within 24 hours; or earlier that five (5) days after the substrate became wet.
  - 4. Do not apply materials in high or gusty winds.
- C. Protection:
  - 1. Special precautions should be taken to avoid vapor transmission (fumes) from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and closed.
  - 2. Protect shrubs, metal, wood trim, glass, asphalt and other building hardware during application from over-spray.
  - 3. Do not permit spray mist or liquid to drift onto surrounding properties.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in Part 1 "Performance Requirements" Article within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

### 2.2 PENETRATING WATER REPELLENT AND GRAFFITI RESISTANT COATINGS

- A. Basis of Design: Tnemec / Chemprobe Dur A Pell GS solvent based RTV Silicone Rubber Water Repellent and Graffiti Protection System. Coating shall contain 15% solids with less than 250 grams per liter VOC.
  - 1. Products:
    - a. SEI Chemical: GPC-101 (with SCS-003 primer).
    - b. Degussa Corporation; Protectosil Antigrffiti.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify the following:
  - 1. The required joint sealants have been installed.
  - 2. New cast-in-place and precast concrete has cured a minimum of twenty-eight (28) days.
  - 3. Surface to be treated is clean, dry and contains no frozen water.
  - 4. Environmental conditions are appropriate for application.

### 3.2 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellent and graffiti resistants. Test for moisture content,

according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.

- B. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent and graffiti resistant. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent and graffiti resistant being deposited on surfaces. Cover live plants and grass.
- C. Coordination with Sealants: Do not apply water repellent and graffiti resistant until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent and graffiti resistant, and sealant materials identical to those used in the work.
- D. Protection:
  - 1. Special precautions should be taken to avoid vapor transmission (fumes) from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and closed.
  - 2. Protect shrubs, metal, wood trim, glass, asphalt and other building hardware during application from over-spray.
  - 3. Do not permit spray mist or liquid to drift onto surrounding properties or parking lots.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and graffiti resistant coating and to instruct Applicator on the product and application method to be used.
- B. Apply specified graffiti resistant coating in accordance with manufacturer's written application instructions.
- C. Material must be applied using solvent resistant, low-pressure application equipment designed for water repellent and graffiti resistant application.
- D. Apply material as shipped by the manufacturer. Do not dilute or thin.
- E. Apply using a low-pressure sprayer with a fan tip that allows for an application pressure of 20 to 40 psi.

1. Apply first coat in a saturating spray application from bottom up. Apply sufficient material to create a 4" to 6" rundown below the contact point. Caution should be used on dense substrates to not over-apply. On dense substrates, minimal rundown is required to avoid over application. Backroll all areas that appear to be fully saturated.
2. Apply a second coat for graffiti protection. Apply once first coat appears dry (30 minutes to 2 hours) depending on temperatures and substrate. All coats should be examined for areas of over application and such areas should be brushed or backrolled to avoid excessive film build and unsightly darkening.

### 3.4 FIELD QUALITY CONTROL

- a. The architect shall be contacted at least 48 hours prior to application.
- B. After water repellent and graffiti resistant coating has cured for five (5) days at low humidity and temperature between 70°-90° F or eight (8) days at high humidity and low temperature between 50°-69° F, all surfaces shall be tested with a light water spray. Recoat any area that indicates water absorption after the water test has completely dried.

### 3.5 CLEANING

- A. Immediately clean water repellent and graffiti resistant from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.
- B. Remove protective coverings from adjacent surfaces and other protected areas.
- C. At completion, remove from the job site, all excess material, debris, and waste resulting from this work. Dispose of water repellent and graffiti resistant containers according to state and local environmental regulations.

**END OF SECTION 09962**

**SECTION 10155 - TOILET COMPARTMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes stainless-steel units as follows:
  - 1. Toilet Enclosures: Overhead braced.
- B. Related Sections include the following:
  - 1. Division 10 "Toilet and Bath Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of cutouts for compartment-mounted toilet accessories.
- C. Samples for Verification: Of each type of color and finish required for units, prepared on 6-inch- square Samples of same thickness and material indicated for Work.

**1.4 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

## PART 2 - PRODUCTS

### 2.1 METAL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Accurate Partitions Corporation.
  2. American Sanitary Partition Corporation.
  3. Bradley Corporation; Mills Partitions.
  4. Global Steel Products Corp.
  5. Hadrian Inc.
  6. Sanymetal; a Crane Plumbing Company.
- B. Stainless-Steel Units: Facing sheets and closures fabricated from ASTM A 666, Type 302 or 304, stainless-steel sheet, leveled to stretcher-leveled flatness.
  1. Stainless-Steel Facing Sheet Thicknesses: Specified thicknesses as follows:
    - a. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.0375 inch.
    - b. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.050 inch.
    - c. Panels: Manufacturer's standard thickness, but not less than 0.0312 inch.
    - d. Doors: Manufacturer's standard thickness, but not less than 0.0312 inch.
  2. Finish: No. 4 bright, directional polish on exposed faces. Exposed surfaces are protected from damage by application of strippable, temporary protective covering before shipment.
- C. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets are pressure laminated to core material. Units have continuous, interlocking molding strip or lapped and formed edge closures. Exposed surfaces are free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections. Corners are sealed by welding or clips. Exposed welds are ground smooth.



1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
  2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
  3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
- D. Pilaster Shoes and Sleeves (Caps): Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch specified thickness and 3 inches high, finished to match hardware.
- E. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

## 2.2 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Stainless steel.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

## 2.3 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions. Make provisions for setting and securing continuous head rail at top of each pilaster. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Doors: Unless otherwise indicated, provide 24-inch- wide in-swinging doors for standard toilet compartments and 36-inch- wide out-swinging doors with a minimum 32-inch- wide clear opening for compartments indicated to be accessible to people with disabilities.

1. Hinges: Manufacturer's standard self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
2. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with accessibility requirements of authorities having jurisdiction. Provide units on both sides of doors at compartments indicated to be accessible to people with disabilities.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch.
    - b. Panels and Walls: 1 inch.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Secure continuous head rail to each pilaster with not less than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

#### **3.2 ADJUSTING**

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

**END OF SECTION 10155**

**SECTION 10431 - SIGNS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Panel signs.
  - 2. Signage accessories.
- B. Related Sections include the following:
  - 1. Division 15 Section "Mechanical Identification" for labels, tags, and nameplates for mechanical equipment.
  - 2. Division 16 Section "Electrical Identification" for labels, tags, and nameplates for electrical equipment.
  - 3. Division 16 Section "Interior Lighting" for illuminated exit signs.
- C. See Civil Drawings for Accessible Parking signage.

**1.3 DEFINITIONS**

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

**1.4 SUBMITTALS**

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings for Panel Signs: Include elevations and large-scale sections of typical members and other components. Show mounting methods, mounting heights, layout, spacing, reinforcement, accessories, and installation details.

1. Provide message list for each sign, including large-scale details of wording, lettering, and braille layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color or character selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
  1. Panel Signs: Full-size Samples of each type of sign required.
  2. Approved samples will not be returned for installation into Project.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by signage manufacturer.
- B. Source Limitations: Obtain each sign type through one source from a single manufacturer.
- C. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.
  1. Code Signage: Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Exit Doors.
    - b. Signs for Accessible Spaces.

## 1.6 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
  1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

**1.7 WARRANTY**

- A. Special Warranty for Panel Signs: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of metal finishes beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

**2.2 PANEL SIGNS**

- A. General: Provide panel signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - 1. Produce smooth panel sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch measured diagonally.
- B. Manufacturers:
  - 1. Allenite Signs; Allen Marking Products, Inc.
  - 2. American Graphics Inc.
  - 3. Andco Industries Corp.
  - 4. APCO Graphics, Inc.
  - 5. ASI Sign Systems, Inc.
  - 6. Best Manufacturing Co.
  - 7. Grimco, Inc.
  - 8. Innerface Sign Systems, Inc.
  - 9. Kaltech Industries Group, Inc.
  - 10. Mills Manufacturing, Inc.
  - 11. Mohawk Sign Systems.

12. Seton Identification Products.
  13. Signature Signs, Inc.
  14. Supersine Company (The).
- C. Aluminum Sheet and Plate: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of 5005-H15.
- D. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to comply with the following requirements:
1. Edge Condition: Square cut.
  2. Corner Condition: Square.
- E. Graphic Content and Style: Provide sign copy that complies with requirements indicated in the Sign Schedule for size, style, spacing, content, mounting height and location, material, finishes, and colors of signage.
- F. Tactile and Braille Copy: Manufacturer's standard process for producing copy complying with ADA Accessibility Guidelines and ICC/ANSI A117.1. Text shall be accompanied by Grade 2 braille. Produce precisely formed characters with square cut edges free from burrs and cut marks.
- G. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
1. Engraved Metal: Fill engraved copy with enamel.

### 2.3 PANEL SIGN TYPES

- A. Toilet Room Signs:
1. Material: Aluminum plate.
  2. Perimeter: Unframed.
  3. Copy: Engraved.
  4. Character Style: As selected by the Architect from the manufacturer's full range of character styles.
  5. Text: According to requirements in the ADA or of authorities having jurisdiction, whichever are more stringent.
  6. Message and Size: See Sign Schedule.
- B. Symbols of Accessibility: Provide 6-inch- high symbol fabricated from opaque nonreflective vinyl film, 0.0035-inch nominal thickness, with pressure-sensitive adhesive backing suitable for both exterior and interior applications.

## 2.4 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors.

## 2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
  - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.
  - 2. Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
  - 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.

### 3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

### 3.4 SIGN SCHEDULE

- A. Each Toilet to have: 8" x 6" panel sign including:
  - 1. Tactile and Grade 2 Braille Room Name: "Men", "Women", as appropriate.
  - 2. ADA symbol and Gender symbol.

END OF SECTION 10431



**SECTION 10520 - FIRE-PROTECTION SPECIALTIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Portable fire extinguishers.
  - 2. Mounting brackets for fire extinguishers.

**1.3 SUBMITTALS**

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles. Include rating and classification for fire extinguishers
- B. Maintenance Data: For fire extinguishers to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain fire extinguishers and fire-protection cabinets through one source from a single manufacturer.
- B. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- C. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

## PART 2 - PRODUCTS

### 2.1 PORTABLE FIRE EXTINGUISHERS

- A. Basis-of-Design Manufacturer: The design for fire protection specialties is based on the JL Industries, Inc. products specified below. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
1. Kidde Fyrnetics.
  2. Larsen's Manufacturing Company.
  3. Potter Roemer; Div. of Smith Industries, Inc.
  4. Watrous; Div. of American Specialties, Inc.
- B. Multipurpose Dry-Chemical Type in Steel Container: JL Industries "Cosmic 5E" UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
1. Valves: Manufacturer's standard.
  2. Handles and Levers: Manufacturer's standard.
  3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- C. Provide fire extinguishers where noted on drawings.

### 2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged units.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
  - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
- C. Identification: Apply decals at locations indicated.

### 3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 10520

**SECTION 10801 - TOILET AND BATH ACCESSORIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Public-use washroom accessories.
  - 2. Warm-air dryers.
  - 3. Childcare accessories.
  - 4. Custodial accessories.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- E. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- F. Stainless Steel Mirror: ASTM A 666, Type 430, with bright polished finish in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. A & J Washroom Accessories, Inc.
  - 2. American Specialties, Inc.
  - 3. Bobrick Washroom Equipment, Inc.

4. Bradley Corporation.
  5. General Accessory Manufacturing Co. (GAMCO).
- B. Toilet Tissue Dispenser:
1. Basis of Design Product: Bobrick B-2890.
  2. Type: Single Jumbo roll toilet tissue dispenser
  3. Mounting: Surface mounted with concealed anchorage.
  4. Material: Stainless steel.
  5. Operation: Noncontrol delivery with mfr's standard spindle.
  6. Capacity: Designed for 10-inch- diameter-core tissue rolls.
- C. Liquid-Soap Dispenser 10-29
1. Basis-of-Design Product: Bobrick B-4112
  2. Description: Designed for dispensing soap in liquid or lotion form.
  3. Mounting: Vertically oriented, surface mounted.
  4. Capacity: 40 fl. Oz.
  5. Materials: Stainless Steel.
  6. Lockset: Provide two(2) keys per unit.
  7. Refill Indicator: Window type.
- D. Grab Bar: 10-26 and 10-27
1. Basis-of-Design Product: Bobrick B-6806 series (36" and 48" length)
  2. Mounting: Flanges with concealed fasteners.
  3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
  4. Outside Diameter: 1-1/2 inches.
  5. Configuration and Length: Straight, 36 inches and 48" long.
- E. Sanitary-Napkin Disposal Unit 10-31
1. Basis-of-Design Product: Bobrick B-270
  2. Mounting: Partition mounted.
  3. Door or Cover: Self-closing disposal-opening cover .
  4. Receptacle: Removable with disposable liner.
  5. Material and Finish: Stainless steel, No. 4 finish (satin).
- F. Mirror Unit: 10-42
1. Basis of Design Product: Bobrick B-1656 1624
  2. Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin or bright finish with square corners mitered to hairline joints and mechanically interlocked.

3. Reflective surface: Polished stainless steel.

G. Utility Shelf: 10-46

1. Basis-of-Design Product: Bobrick B-239
2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
3. Size: 34" long
4. Material and Finish: Not less than nominal 0.05-inch- thick stainless steel, No. 4 finish (satin).

## 2.3 DIAPER CHANGING STATION

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. General Accessory Manufacturing Co. (GAMCO).

B. Diaper Changing Station 10-34

1. Basis-of-Design Product: Bobrick B2210
2. Description: Surface-mounted folding table unit with liner dispensing operation.
3. Material and Finish: High Impact grey polyethylene with foam core.
4. Unit shall support loads up to 250 lbs and comply with ADAAG Guidelines.

## 2.4 WARM-AIR DRYERS

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Dryer, Inc.
3. American Specialties, Inc.
4. Bobrick Washroom Equipment, Inc.
5. Bradley Corporation.
6. Excel Dryer Corporation.
7. World Dryer Corporation.

B. Warm-Air Dryer: 10-50

1. Basis-of-Design Product: Bobrick B-740
2. Mounting: Surface mounted.
3. Operation: Electronic-sensor activated with timed power cut-off switch.
  - a. Operation Time: 80 seconds.
4. Cover Material and Finish: Steel, with white enamel finish.
5. Electrical Requirements: 115 V, 20 A, 2300 W.

## 2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10801



**SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following basic mechanical materials and methods to complement other Division 15 Sections:
  - 1. Dielectric fittings.
  - 2. Mechanical sleeve seals.
  - 3. Escutcheons.
  - 4. Piping materials and installation instructions common to most piping systems.
  - 5. Labeling and identifying mechanical systems and equipment is specified in Division 15 Section "Mechanical Identification."
  - 6. Installation requirements common to equipment specification sections.
  - 7. Touchup painting and finishing.
  - 8. Concrete base construction requirements.
  - 9. Field-fabricated metal and wood equipment supports.
  - 10. Non-shrink grout for equipment installations.
  - 11. Prefabricated roof curbs and pipe portals.
  - 12. Cutting and patching
  - 13. Final inspection.
  - 14. Guarantee.
- B. Pipe and pipe fitting materials are specified in Division 15 piping Sections.

**1.3 DEFINITIONS**

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for rubber materials:
  - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
  - 2. NBR: Acrylonitrile-butadiene rubber.

#### 1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for following piping specialties:
  - 1. Dielectric Fittings.
  - 2. Mechanical sleeve seals.
  - 3. Escutcheons.
- C. Samples of color, lettering style, and other graphic representation required for each identification material and device.
- D. Shop drawings detailing fabrication and installation for metal and wood supports and anchorage for mechanical materials and equipment.
- E. Coordination drawings for access panel and door locations.
- F. Prepare coordination drawings according to Division 1 Section "Submittals" to a 1/4 inch equals 1 foot scale or larger. Detail major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Show where sequence and coordination of installations are important to the efficient flow of the work. Failure to prepare coordination drawings will result in the Contractor(s) assuming responsibility for any changes involving relocation of equipment, piping, devices, etc. This relocation shall come as no additional cost to the Owner. Coordination drawings shall include the following:

1. Proposed locations of piping, ductwork, equipment, and materials. Include the following:
  - a. Planned piping layout, including valve and specialty locations and valve stem movement.
  - b. Planned duct systems layout, including elbow radii and duct accessories.
  - c. Clearances for installing and maintaining insulation.
  - d. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
  - e. Equipment service connections and support details.
  - f. Exterior wall and foundation penetrations.
  - g. Sizes and location of required concrete pads and bases.
2. Scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers, and other ceiling-mounted items.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

### **1.6 SEQUENCING AND SCHEDULING**

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction to allow for mechanical installations.
- C. Coordinate installation of required supporting devices, and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- D. Sequence, coordinate, and integrate installations of mechanical materials and equipment for efficient flow of the work. Coordinate installation of large equipment requiring positioning before closing in building.

- E. Coordinate connection of mechanical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- F. Coordinate requirements for access panels and doors if mechanical items requiring access are concealed behind finished surfaces. Access panels and doors are specified in Division 8 Section "Access Doors."
- G. Coordinate installation of identifying devices after completing covering and painting, if devices are applied to surfaces. Install identifying devices before installing acoustical ceilings and similar concealment.

### 1.7 SITE INSPECTION

- A. Before submitting proposal, examine all existing conditions affecting compliance with Division 15 and drawings by visiting site and/or building. Ascertain access to site, available storage space and delivery facilities.
- B. Location and elevation of existing utilities, such as sewers, water piping, conduit, etc., are as exact as can be determined from available information and their accuracy is not guaranteed. Exact location and elevation of these existing services shall be verified by Contractor prior to excavation or installation of work. Exercise special care when working at or near general location of existing utilities to avoid damage to utility services, as well as to assure safety.
- C. Connections to or relocation of existing utility lines requiring temporary discontinuation of utility services which are in active use shall be scheduled and coordinated with Utility companies and representatives of Owner. Premium time required for installation of connections and relocations shall be included in bid. Services shall not be left disconnected at end of working day or weekend unless authorized by representatives of Utilities and Owner. Existing utility services damaged due to operation of Contractor shall be repaired to satisfaction of Owner and Utility Company at Contractor's expense.

### 1.8 PERMITS, INSPECTIONS, CODES AND FEES

- A. Comply with all the latest Federal, State, City and Utility Company, rules, regulations, and ordinances having jurisdiction over this work. These codes shall supersede the specifications and drawings. Applicable codes shall include, but shall not be limited to the following:
  - 1. Americans with Disabilities Act Accessibility Guidelines.
  - 2. Uniform Federal Accessibility Standards.
  - 3. BOCA Code, 2002 Edition.
  - 4. International Mechanical Code 2003.
  - 5. Latest Illinois Plumbing Code.

6. All applicable NFPA Codes.
  7. All applicable electric utility rules, regulations, and standards.
- B. All work shall be in accordance with the latest edition of the International Mechanical Code and the Mechanical and Plumbing Codes in the locale in which the work is being performed.
- C. All equipment furnished for this project shall be listed and labeled by a nationally recognized testing laboratory.
- D. The complete mechanical and plumbing installation shall be inspected. The inspecting agency shall certify that the installation is in accordance with the latest editions of the International Mechanical and local Plumbing Codes or such other standards as may be applicable. Bear all costs of such inspections and certifications.

### 1.9 PUBLIC UTILITIES

- A. Work of this contract associated with the work of the local utility company shall be installed in strict accordance with the standards of the utility company.

### 1.10 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT", and the requirements listed herein.
- B. Obtain a full-size set of signed and sealed contract drawings and specifications pertaining to this work immediately upon commencing work. This set of documents shall be kept on project site at all times and shall be used for recording and the revision of the following information on a day-to-day basis:
1. Changes made to suit field conditions.
  2. Changes made through "Field Order" or "Change Order".
  3. Accurate dimensions of all buried or concealed work.
    - a. All dimensions shall be to at least two (2) permanent structure points.
  4. Precise locations of all concealed valves, controls and devices.
    - a. All dimensions shall be to at least two (2) permanent structure points.
- C. Contractor shall update original contract information as may be required, and replace with record condition information as was recorded at jobsite during time of installation. When completed the record drawings shall contain all of the record information recorded on the contract drawings at the jobsite in red ink.

- D. After the transferring of record information onto the record drawing has been completed, the record drawings shall be submitted to the Architect/Engineer for review prior to the authorization for final payment to Contractor. Record drawings (sepias) shall be certified as to their correctness by the signature of Contractor and shall be stamped or otherwise permanently identified as "Record Drawings".

## 1.11 MAINTENANCE MANUALS

- A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT". In Addition to the requirements specified in Division 1, include the following information for equipment items:
  - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  - 2. Manufacturer's printed operating procedure to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  - 4. Names, addresses, telephone numbers, etc., of local suppliers, factory representatives or service agencies for all major items of equipment and systems.
  - 5. Servicing instructions and lubrication charts and schedules.
  - 6. Software programming manuals.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other 15000 Sections Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufactures listed on Division 15000 drawings are the basis of design. Alternate manufacturers listed in Part 2 may be submitted for review by the Engineer with the following provision:
    - a. First-named manufacturer's device, equipment or system has been used to meet job requirements and to determine space, weight and dimensional requirements. Contractor shall verify that equipment by other than first named manufacturers used as a basis for proposal will meet job requirements and will fit allocated space.

- b. Deviations from specified devices, equipment or system: While it is recognized that devices, equipment or systems by other than the first named manufacturer may not be exactly identical, the Contractor shall verify and provide devices, equipment or systems that meet the specified job requirements. All deviations of devices, equipment or systems from the first named manufacturer shall be clearly noted on shop drawing submittal or by cover letter. Engineer reserves the right to reject all devices, equipment or systems that do not meet the specified job requirements.
- c. Submission of shop drawings will be considered as indicating that space and weight requirements have been reviewed and that submitted equipment will fit space allocated with due concern given to access required for maintenance purposes. If this alternate manufacturer, listed in Part 2, is submitted and the weight of that equipment exceeds the first-name manufacturer's device, the Contractor shall coordinate with a Structural Engineer any additional structural elements that may be required. This shall come as no additional cost to the Owner.
- d. No extra cost will be allowed due to the effect on other trades when bid is based on products other than first named manufacturers. Coordination responsibility for substituted equipment or use of products other than first named manufacturer shall be that of Contractor furnishing equipment.
- e. Electrical Characteristics for Mechanical Equipment: If minimum energy ratings or efficiencies are specified, equipment submitted by the Contractor for the Engineer review shall comply with requirements. If mechanical equipment of higher electrical characteristics is furnished which results in modification to the electrical work, including but not limited to, connecting electrical services, circuit breakers, and conduit sizes, these changes shall come as no additional cost to the Owner. Modification of the electrical systems as they apply to the original contract documents will be performed by the Consultants of record. Contractor shall be liable to pay for services rendered by the Consultants for development of modifications to the original contract documents.

## 2.2 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:
  - a. Capitol Manufacturing Co.
  - b. Central Plastics Company.
  - c. Eclipse, Inc.
  - d. Epco Sales, Inc.
  - e. Hart Industries, International, Inc.
  - f. Watts Industries, Inc.; Water Products Div.
  - g. Zurn Industries, Inc.; Wilkins Div.
  
- D. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 Deg. F.
  1. Manufacturers:
    - a. Calpico, Inc.
    - b. Lochinvar Corp.
  
- E. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F
  1. Manufacturers:
    - a. Perfection Corp.
    - b. Prevision Plumbing Products, Inc.
    - c. Sioux Chief Manufacturing Co., Inc.
    - d. Victaulic Co. of America.

### 2.3 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.
  1. Available Manufacturers:
    - a. Calpico, Inc.
    - b. Metraflex Co.
    - c. Thunderline / link seal.
  2. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface pipe. Include type and number required for pipe material and size of pipe
  3. Pressure Plates: Plastic or carbon steel. Include two for each sealing element.



4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

## 2.4 SLEEVES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations.
- B. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- C. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.  
Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
  1. Underdeck Clamp: Clamping ring with setscrews.

## 2.5 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Cast-Brass Type: With setscrew.
  1. Finish: Polished chrome-plate or Rough brass.
- C. Split-Casing, Brass Type: With concealed hinge and set screw.
  1. Finish: Polished chrome-plate or Rough brass.
- D. One-Piece, Floor-Plate Type: Cast-iron floor plate.

## PART 3 - EXECUTION

### 3.1 PIPING, TUBE, AND FITTINGS

- A. Refer to individual Division 15 piping sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

### 3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 15 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
  - 1. New Piping:
    - a. Insulated Piping: Split casing, brass type.
    - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casing, brass type, chrome plated.
    - c. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casing, brass type, chrome plated.
    - d. Bare Piping in Unfinished Service Spaces: Split casing, brass type, rough brass.
    - e. Bare Piping in Equipment Rooms: Split casing, brass type, chrome plated.

- f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
  - 3. Install sleeves that are large enough to provide ¼-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
    - a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
    - b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 7 Section "Sheet Metal Flashing and Trim" for flashing.
      - 1) Seal space outside of sleeve fittings with grout.
  - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants. Refer to Division 7 Section "Joint Sealants" for materials.
- O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
  - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
  - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical link seals. Install per manufacturer's instructions.
- Q. Verify final equipment locations for roughing-in.
- R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
  - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
- G. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

### 3.5 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

### 3.6 PAINTING

- A. Painting of mechanical systems, equipment, and components is specified in Division 9.
- B. Apply paint to exposed piping according to the following, unless otherwise indicated:
  1. Interior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
  2. Interior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
  3. Interior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include finish coat over enamel undercoat and primer.
  4. Exterior, Ferrous Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
  5. Exterior, Galvanized-Steel Piping: Use semigloss, acrylic-enamel finish. Include two finish coats over galvanized metal primer.
  6. Exterior, Ferrous Supports: Use semigloss, acrylic-enamel finish. Include two finish coats over rust-inhibitive metal primer.
- C. Do not paint piping specialties with factory-applied finish.
- D. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

### 3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
  - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

### 3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 5 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal support accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

### 3.9 GROUTING

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
  - 1. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  - 2. Design Mix: 5000-psi, 28-day compressive strength
  - 3. Packaging: Premixed and factory packaged.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.

- D. Avoid air entrapment during placement of grout.
- E. Place grout on concrete bases and provide smooth bearing surface for equipment.
- F. Place grout around anchors.
- G. Cure placed grout.

### 3.10 PREFABRICATED ROOF CURBS AND PIPE PORTALS

- A. Enclosed Curbs and Equipment Rails. Welded, galvanized heavy gauge metal box shapes shall be insulated and of suitable cross section for span indicated and equipment weights. Include insulation stops and cant for bitumen roofs. All curbs to have preservative-treated wood nailer top strip and flanged perimeter bottom for deck attachment.
- B. Height: Minimum curb height shall be 8" above finished roofing. Supply 12" – 20" curbs with 4" – 8" insulation stops.
- C. Length: Curb equipment rails shall be of sufficient length to span to next truss.
- D. Counter Flashing: Curb equipment rails and other roof-mounted ducts or equipment that do not include factory counter flashings shall be furnished with stainless steel or copper counter flashings.
- E. Sloping Roofs: Where slope of roof deck exceeds ¼ inch per foot, fabricate to match slope.
- F. Pipe Portals: Pipe portal shall include prefabricated roof curb with ABS cap with EPDM rubber pipe seal and stainless steel band clamp.

### 3.11 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:
  - 1. Perform cutting, fitting, and patching of mechanical and plumbing equipment and materials required to:
    - a. Uncover work to provide for installation of ill-timed work.
    - b. Remove and replace Work not conforming to requirements of the Contract Documents.
    - c. Remove samples of installed Work as specified for testing.
    - d. Install equipment and materials in existing structures.

- e. Upon written instructions from the Architect, uncover and restore Work to provide for Architect observation of concealed Work.
2. Cut, remove, and legally dispose of selected mechanical and plumbing equipment, components, and materials as indicated, including but not limited to removal of mechanical and plumbing items indicated to be removed and items made obsolete by the new Work.
3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
4. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
5. Patch existing finished surfaces and building components using new materials matching existing materials and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
  - a. Refer to Division 1 Section "DEFINITIONS AND STANDARDS" for definition of experienced "Installer".

### 3.12 FINAL INSPECTION

- A. Contractor shall review requirements of Contract Document's inspect work and inform parties involved of work to be corrected or completed before project can be deemed substantially complete.
- B. Notify Owner's Representative in writing, when project is substantially complete listing those items of work remaining incomplete and anticipated date that remaining work will be completed. Final inspection of project will then be scheduled by Architect/Engineer. Architect/Engineer reserves right to cancel and re-schedule inspection in event considerable more work remains to be completed or corrected than indicated in written request for inspection.
- C. Items not completed or found not complying with drawings or specifications by Architect/Engineer will be identified in inspection report by Architect/Engineer.
- D. Copy of final inspection report will be given to Contractor and deficient items on inspection report shall be corrected. Contractors shall initial and date items on report after corrections have been completed.
- E. Architect/Engineer will make final check after items have been corrected. Contractor shall be present during final check and shall verify that corrections have been made.

END OF SECTION 15050



**SECTION 15060 - HANGERS AND SUPPORTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following hangers and supports for mechanical system piping and equipment:
  - 1. Steel pipe hangers and supports.
  - 2. Trapeze pipe hangers.
  - 3. Metal framing systems.
  - 4. Thermal-hanger shield inserts.
  - 5. Fastener systems.
  - 6. Pipe positioning systems.
  - 7. Equipment supports.
- B. Related Sections include the following:
  - 1. Division 5 Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
  - 2. Division 15 Section "Mechanical Vibration and Seismic Controls" for vibration isolation devices.
  - 3. Division 15 Section(s) "Metal Ducts" for duct hangers and supports.

**1.3 DEFINITIONS**

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

**1.4 PERFORMANCE REQUIREMENTS**

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

**1.5 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Steel pipe hangers and supports.
  - 2. Thermal-hanger shield inserts.
  - 3. Pipe positioning systems.
- B. Welding certificates.

**1.6 QUALITY ASSURANCE**

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel."
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. ASME Boiler and Pressure Vessel Code: AWS D1.1, "Structural Welding Code – Steel."

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

## 2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
  - 1. B-Line Systems, Inc.; a division of Cooper Industries.
  - 2. Carpenter & Paterson, Inc.
  - 3. ERICO/Michigan Hanger Co.
  - 4. Globe Pipe Hanger Products, Inc.
  - 5. Anvil International (Grinnell Corp.)
  - 6. GS Metals Corp.
  - 7. National Pipe Hanger Corporation.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

## 2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

## 2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
  - 1. B-Line Systems, Inc.; a division of Cooper Industries.
  - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
  - 3. GS Metals Corp.
  - 4. Power-Strut Div.; Tyco International, Ltd.
  - 5. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.

## 2.5 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig minimum, compressive-strength insulation insert encased in sheet metal shield.

- B. Manufacturers:
  - 1. Carpenter & Paterson, Inc.
  - 2. ERICO/Michigan Hanger Co.
  - 3. PHS Industries, Inc.
  - 4. Pipe Shields, Inc.
  - 5. Rilco Manufacturing Company, Inc.
  - 6. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

## 2.6 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  - 1. Manufacturers:
    - a. Hilti, Inc.
    - b. ITW Ramset/Red Head.
    - c. Masterset Fastening Systems, Inc.
    - d. MKT Fastening, LLC.
    - e. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
  - 1. Manufacturers:
    - a. B-Line Systems, Inc.; a division of Cooper Industries.

- b. Empire Industries, Inc.
- c. Hilti, Inc.
- d. ITW Ramset/Red Head.
- e. MKT Fastening, LLC.
- f. Powers Fasteners.

## 2.7 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
- B. Manufacturers:
  - 1. C & S Mfg. Corp.
  - 2. HOLDRITE Corp.; Hubbard Enterprises.
  - 3. Samco Stamping, Inc.

## 2.8 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

## 2.9 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
  - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
  - 2. Design Mix: 5000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
  - 2. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
  - 3. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
  - 4. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
  - 5. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.
  - 6. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
  - 7. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
  - 8. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
  - 9. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
  - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
  - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- G. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
  2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
  3. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- H. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
  2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction to attach to top flange of structural shape.
  3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
  4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
  5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
  6. C-Clamps (MSS Type 23): For structural shapes.
  7. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
  8. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
  9. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    - a. Light (MSS Type 31): 750 lb.
    - b. Medium (MSS Type 32): 1500 lb.
    - c. Heavy (MSS Type 33): 3000 lb.
  10. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
  11. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
  12. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- I. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
  2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
  3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

### 3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
  - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
  - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
  - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 15 Section "Plumbing Fixtures" for plumbing fixtures.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- I. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- J. Install lateral bracing with pipe hangers and supports to prevent swaying.
- K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges,



and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

- L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- N. Insulated Piping: Comply with the following:
  - 1. Attach clamps and spacers to piping.
    - a. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
    - b. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
  - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
    - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
  - 4. Shield Dimensions for Pipe: Not less than the following:
    - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
    - b. NPS 4: 12 inches long and 0.06 inch thick.
    - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
  - 5. Insert Material: Length at least as long as protective shield.
  - 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

### 3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

### 3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

### 3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

### 3.6 PAINTING

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 "Painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

**END OF SECTION 15060**

**SECTION 15075 - MECHANICAL IDENTIFICATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following mechanical identification materials and their installation:
  - 1. Equipment nameplates.
  - 2. Equipment markers.
  - 3. Access panel and door markers.
  - 4. Pipe markers.
  - 5. Duct markers.
  - 6. Valve tags.
  - 7. Valve schedules.
  - 8. Warning tags.

**1.3 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Valve numbering scheme.
- D. Valve Schedules: For each piping system. Furnish extra copies (in addition to mounted copies) to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. ASME Compliance: Comply with ASME A13.1, "Scheme for the Identification of Piping Systems," for letter size, length of color field, colors, and viewing angles of identification devices for piping.

## 1.5 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with location of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal, with data engraved or stamped, for permanent attachment on equipment.
  - 1. Data:
    - a. Manufacturer, product name, model number, and serial number.
    - b. Capacity, operating and power characteristics, and essential data.
    - c. Labels of tested compliances.
  - 2. Location: Accessible and visible.
  - 3. Fasteners: As required to mount on equipment.
- B. Equipment Markers: Engraved, color-coded laminated plastic. Include contact-type, permanent adhesive.
  - 1. Terminology: Match schedules as closely as possible.
  - 2. Data:
    - a. Name and plan number.
    - b. Equipment service.
  - 3. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.
- C. Access Panel and Door Markers: 1/16-inch- thick, engraved laminated plastic, with abbreviated terms and numbers corresponding to identification. Provide 1/8-inch center hole for attachment.
  - 1. Fasteners: Self-tapping, stainless-steel screws or contact-type, permanent adhesive.

## 2.2 PIPING IDENTIFICATION DEVICES

- A. Manufactured Pipe Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
  - 1. Colors: Comply with ASME A13.1, unless otherwise indicated.
  - 2. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
  - 3. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers extending 360 degrees around pipe at each location.
  - 4. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers at least three times letter height and of length required for label.
  - 5. Arrows: Integral with piping system service lettering to accommodate both directions; or as separate unit on each pipe marker to indicate direction of flow.

## 2.3 DUCT IDENTIFICATION DEVICES

- A. Manufactured Duct Markers, General: Preprinted, color-coded, with lettering indicating service, and showing direction of flow.
  - 1. Colors: See Paragraph 3.4 "Duct Identification".
  - 2. Lettering: Use duct system terms indicated and abbreviate only as necessary for each application length.
  - 3. Strip-type markers at least three times letter height and of length required for label.
  - 4. Arrows: Integral with duct system service lettering to accommodate both directions; or as separate unit on each duct marker to indicate direction of flow.

## 2.4 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/2-inch letters for piping system abbreviation and 1/2-inch numbers, with numbering scheme approved by Engineer. Provide 5/32-inch hole for fastener.
  - 1. Material: 0.032-inch- thick brass.
  - 2. Valve-Tag Fasteners: Brass wire-link or beaded chain; or S-hook.

## 2.5 VALVE SCHEDULES

- A. Valve Schedules: For each piping system, on standard-size bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open,

closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-Schedule Frames: Glazed display frame for removable mounting on masonry walls for each page of valve schedule. Include mounting screws.
2. Frame: Extruded aluminum.
3. Glazing: ASTM C 1036, Type I, Class 1, Glazing Quality B, 2.5-mm, single-thickness glass.

## **PART 3 - EXECUTION**

### **3.1 APPLICATIONS, GENERAL**

- A. Products specified are for applications referenced in other Division 15 Sections. If more than single-type material, device, or label is specified for listed applications, selection is Installer's option.

### **3.2 EQUIPMENT IDENTIFICATION**

- A. Install and permanently fasten equipment nameplates on each major item of mechanical equipment that does not have nameplate or has nameplate that is damaged or located where not easily visible. Locate nameplates where accessible and visible. Include nameplates for the following general categories of equipment:
  1. Pumps and similar motor-driven units.
  2. Fans, blowers, primary balancing dampers.
- B. Install equipment markers with permanent adhesive on or near each major item of mechanical equipment.
  1. Letter Size: Minimum 3/4 inch.
  2. Data: Distinguish among multiple units.
  3. Locate markers where accessible and visible. Include markers for the following general categories of equipment:
    - a. Main control and operating valves, including safety devices and hazardous units such as gas outlets.
    - b. Fire department hose valves and hose stations.
    - c. Meters, gages, thermometers, and similar units.
    - d. Pumps and similar motor-driven units.
    - e. Fans, blowers, primary balancing dampers.
    - f. Tanks and pressure vessels.

- g. Strainers, filters, humidifiers, water-treatment systems, and similar equipment.

### 3.3 PIPING IDENTIFICATION

- A. Install manufactured pipe markers indicating service on each piping system. Install with flow indication arrows showing direction of flow.
  - 1. Letter Size: Minimum 1-1/2 inch.
  - 2. Pipes with OD, Including Insulation, Less Than 6 Inches: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, 1-1/2 inches wide, lapped at least 1-1/2 inches at both ends of pipe marker, and covering full circumference of pipe.
  - 3. Pipes with OD, Including Insulation, 6 Inches and Larger: Self-adhesive pipe markers. Use color-coded, self-adhesive plastic tape, at least 1-1/2 inches wide, lapped at least 3 inches at both ends of pipe marker, and covering full circumference of pipe.
- B. Locate pipe markers and color bands where piping is exposed in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior nonconcealed locations as follows:
  - 1. Near each valve and control device.
  - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
  - 3. Near penetrations through walls, floors, ceilings, and nonaccessible enclosures.
  - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
  - 5. Near major equipment items and other points of origination and termination.
  - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.

### 3.4 DUCT IDENTIFICATION

- A. Install duct markers with permanent adhesive on air ducts in the following color codes:
  - 1. Blue: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
  - 2. Letter Size: Minimum 1-1/2 inch.
- B. Locate markers near points where pipes enter into concealed spaces and at maximum intervals of 20 feet in each space where pipes are exposed.



**3.5 VALVE-TAG INSTALLATION**

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; plumbing fixture supply stops; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

**3.6 VALVE-SCHEDULE INSTALLATION**

- A. Mount valve schedule on wall in accessible location in each major equipment room.

**3.7 ADJUSTING**

- A. Relocate mechanical identification materials and devices that have become visually blocked by other work.

**3.8 CLEANING**

- A. Clean faces of mechanical identification devices.

**END OF SECTION 15075**

**SECTION 15080 - MECHANICAL INSULATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes mechanical insulation for duct, equipment, and pipe, including the following:
  - 1. Insulation Materials:
    - a. Flexible elastomeric.
    - b. Mineral fiber.
  - 2. Insulating cements.
  - 3. Adhesives.
  - 4. Mastics.
  - 5. Sealants.
  - 6. Factory-applied jackets.
  - 7. Tapes.
  - 8. Securements.
  - 9. Corner angles.
- B. Related Sections include the following:
  - 1. Division 15 Section "Metal Ducts" for duct liners.

**1.3 DEFINITIONS**

- A. ASJ: All-service jacket.
- B. FSK: Foil, scrim, kraft paper.
- C. SSL: Self-sealing lap.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product used, identify thermal conductivity, thickness, and jackets (both factory and field applied, if any) and use manufacturer's data sheets.

**1.5 QUALITY ASSURANCE**

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
  - 1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

**1.7 COORDINATION**

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 15 Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

**1.8 SCHEDULING**

- A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 INSULATION MATERIALS**

- A. Refer to Part 3 schedule articles for requirements about where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with applied FSK jacket. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in Part 2 "Factory-Applied Jackets" Article.
1. Available Products:
    - a. CertainTeed Corp.; Commercial Board.
    - b. Fibrex Insulations Inc.; FBX.
    - c. Johns Manville; 800 Series Spin-Glas.
    - d. Knauf Insulation; Insulation Board.
    - e. Manson Insulation Inc.; AK Board.
    - f. Owens Corning; Fiberglas 700 Series.

**2.3 ADHESIVES**

- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated.
- B. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Manufacturers/Products:
    - a. Aeroflex USA Inc.; Aero seal.
    - b. Armacell LCC; 520 Adhesive.
    - c. Foster Products Corporation, H. B. Fuller Company; 85-75.

- d. RBX Corporation; Rubatex Contact Adhesive.
- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
- 1. Manufacturers/Products:
    - a. Childers Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
- D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
- 1. Manufacturers/Products:
    - a. Childers Products, Division of ITW; CP-82.
    - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
    - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
    - d. Marathon Industries, Inc.; 225.
    - e. Mon-Eco Industries, Inc.; 22-25.
- E. PVC Jacket Adhesive: Compatible with PVC jacket.
- 1. Manufacturers/Products:
    - a. Dow Chemical Company (The); 739, Dow Silicone.
    - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
    - c. P.I.C. Plastics, Inc.; Welding Adhesive.
    - d. Red Devil, Inc.; Celulon Ultra Clear.
    - e. Speedline Corporation; Speedline Vinyl Adhesive.

## 2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

## 2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

- 1. Manufacturers/Products:

- a. Childers Products, Division of ITW; CP-52.
  - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
  - c. Marathon Industries, Inc.; 130.
  - d. Mon-Eco Industries, Inc.; 11-30.
  - e. Vimasco Corporation; 136.
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
  3. Service Temperature Range: Minus 50 to plus 180 deg F.
  4. Color: White.

## 2.6 SEALANTS

### A. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers/Products:
  - a. Childers Products, Division of ITW; CP-76-8.
  - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
  - c. Marathon Industries, Inc.; 405.
  - d. Mon-Eco Industries, Inc.; 44-05.
  - e. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

### B. ASJ Flashing Sealants, and Vinyl and PVDC Jacket Flashing Sealants:

1. Products:
  - a. Childers Products, Division of ITW; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

## 2.7 FACTORY-APPLIED JACKETS

- A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
  2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
  3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

## 2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
1. Manufacturers/Products:
    - a. Johns Manville; Zeston.
    - b. P.I.C. Plastics, Inc.; FG Series.
    - c. Proto PVC Corporation; LoSmoke.
    - d. Speedline Corporation; SmokeSafe.
  2. Adhesive: As recommended by jacket material manufacturer.
  3. Color: White.
  4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
    - a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
  5. Factory-fabricated tank heads and tank side panels.

## 2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136 and UL listed.
1. Manufacturers/Products:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
    - b. Compac Corp.; 104 and 105.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
    - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
  2. Width: 3 inches.
  3. Thickness: 11.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.
  7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136 and UL listed.
1. Manufacturers/Products:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
    - b. Compac Corp.; 110 and 111.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
    - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
  2. Width: 3 inches.
  3. Thickness: 6.5 mils.
  4. Adhesion: 90 ounces force/inch in width.
  5. Elongation: 2 percent.
  6. Tensile Strength: 40 lbf/inch in width.
  7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
1. Manufacturers/Products:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0555.
    - b. Compac Corp.; 130.
    - c. Ideal Tape Co., Inc., an American Biltrite Company; 370 White PVC tape.
    - d. Venture Tape; 1506 CW NS.



2. Width: 2 inches.
  3. Thickness: 6 mils.
  4. Adhesion: 64 ounces force/inch in width.
  5. Elongation: 500 percent.
  6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive and UL listed.
1. Manufacturers/Products:
    - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
    - b. Compac Corp.; 120.
    - c. Ideal Tape Co., Inc., an American Bilrite Company; 488 AWF.
    - d. Venture Tape; 3520 CW.
  2. Width: 2 inches.
  3. Thickness: 3.7 mils.
  4. Adhesion: 100 ounces force/inch in width.
  5. Elongation: 5 percent.
  6. Tensile Strength: 34 lbf/inch in width.

## 2.10 SECUREMENTS

- A. Bands:
1. Manufacturers/Products:
    - a. Childers Products; Bands.
    - b. PABCO Metals Corporation; Bands.
    - c. RPR Products, Inc.; Bands.
  2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
  3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with wing or closed seal.
  4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Insulation Pins and Hangers:
1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated.
    - a. Manufacturers/Products:

- 1) AGM Industries, Inc.; CWP-1.
  - 2) GEMCO; CD.
  - 3) Midwest Fasteners, Inc.; CD.
  - 4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch-diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
- a. Manufacturers/Products:
    - 1) AGM Industries, Inc.; CWP-1.
    - 2) GEMCO; Cupped Head Weld Pin.
    - 3) Midwest Fasteners, Inc.; Cupped Head.

## 2.11 CORNER ANGLES

- A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
  1. Verify that systems and equipment to be insulated have been tested and are free of defects.
  2. Verify that surfaces to be insulated are clean and dry.

### 3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless steel surfaces, use demineralized water.

### 3.3 COMMON INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs.
- E. Install multiple layers of insulation with longitudinal and end seams staggered.
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
- I. Install insulation with least number of joints practical.
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
  - 1. Install insulation continuously through hangers and around anchor attachments.
  - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
  - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
  - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
- K. Apply adhesive, mastics and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

- L. Install insulation with factory-applied jackets as follows:
  - 1. Draw jacket tight and smooth.
  - 2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.
    - a. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap.
  - 3. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
  - 4. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
- P. For above ambient services, do not install insulation to the following:
  - 1. Vibration-control devices.
  - 2. Testing agency labels and stamps.
  - 3. Nameplates and data plates.
  - 4. Cleanouts.

### 3.4 PENETRATIONS

- A. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
  - 1. Seal penetrations with flashing sealant.
  - 2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant.
  - 3. Seal jacket to wall flashing with flashing sealant.
- B. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

### 3.5 DUCT AND PLENUM BOARD INSULATION INSTALLATION

- A. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
    - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
  4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
    - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.
  5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as

closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.

6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

### **3.6 FIELD QUALITY CONTROL**

- A. Contractor to perform the following field tests and inspections and prepare test reports:
  1. Inspect ductwork, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location for each duct system defined in the "Duct Insulation Schedule, General" Article.
  2. Inspect pipe, fittings, and valves, randomly selected by Engineer, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, three locations of threaded valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- B. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements. Remove defective Work.
- C. Install new insulation and jackets to replace insulation and jackets removed for inspection. Repeat inspection procedures after new materials are installed.

### **3.7 DUCT INSULATION SCHEDULE, GENERAL**

- A. Materials and thicknesses for systems are specified in schedules at the end of this Section.
- B. Plenums and Ducts Requiring Insulation:
  1. Outdoor air.
  2. Exhaust between isolation damper and penetration of building exterior.

### **3.8 INDOOR DUCT AND PLENUM INSULATION SCHEDULE**

- A. Exhaust between isolation damper and penetration of building exterior insulation shall be the following:

1. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- B. Exposed or concealed rectangular outside air duct insulation:
  1. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu.ft nominal density.

**END OF SECTION 15080**

**SECTION 15122 - METERS AND GAGES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following meters and gages for mechanical systems:
  - 1. Thermometers.

**1.3 DEFINITIONS**

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Schedule for thermometers, indicating manufacturer's number, scale range, and location for each.
- C. Product Certificates: For each type of thermometer, signed by product manufacturer.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.



## 2.2 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Available Manufacturers:
  - 1. Palmer - Wahl Instruments Inc.
  - 2. Terice, H. O. Co.
  - 3. Weiss Instruments, Inc.
  - 4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Case: Die-cast aluminum 9" long.
- C. Tube: Red or blue reading, organic-liquid filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Glass.
- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- G. Stem: Metal, for installation in mounting bracket and of length to suit installation.
- H. Mounting Bracket: Flanged fitting for attachment to duct and made to hold thermometer stem.
- I. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

## PART 3 - EXECUTION

### 3.1 THERMOMETER APPLICATIONS

- A. Install liquid-in-glass thermometers in the following locations:
  - 1. Outside-air, return-air, and mixed-air ducts.

### 3.2 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.

### 3.3 CONNECTIONS

- A. Install meters and gages adjacent to machines and equipment to allow service and maintenance for meters, gages, machines, and equipment.

**3.4 ADJUSTING**

- A. Adjust faces of meters and gages to proper angle for best visibility.

**END OF SECTION 15122**

**SECTION 15181 - HYDRONIC PIPING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes condensate drain piping.

**1.3 DEFINITIONS**

- A. CPVC: Chlorinated polyvinyl chloride.
- B. PVC: Polyvinyl chloride.

**1.4 SUBMITTALS**

- A. Shop Drawings: Detail fabrication of pipe anchors, hangers, special pipe support assemblies, alignment guides, and their attachment to the building structure. Detail location of anchors, alignment guides.
- B. Welding Certificates: Copies of certificates for welding procedures and personnel.
- C. Field Test Reports: Written reports of tests specified in Part 3 of this Section. Include the following:
  - 1. Test procedures used.
  - 2. Test results that comply with requirements.
  - 3. Failed test results and corrective action taken to achieve requirements.

**1.5 QUALITY ASSURANCE**

- A. Welding: Qualify processes and operators according to the ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

- B. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

## 1.6 COORDINATION

- A. Coordinate layout and installation of hydronic piping and suspension system components with other construction, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate pipe fitting pressure classes with products specified in related Sections.
- C. Coordinate installation of pipe sleeves for penetrations through exterior walls and floor assemblies.

## PART 2 - PRODUCTS

### 2.1 PIPING MATERIALS

- A. General: Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

### 2.2 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.
- B. Wrought-Copper Fittings: ASME B16.22.
- C. Solder Filler Metals: ASTM B 32, 95-5 tin antimony.

## PART 3 - EXECUTION

### 3.1 PIPING APPLICATIONS

- A. Condensate Drain Lines: Use Type L drawn-temper copper tubing with soldered joints.

### 3.2 PIPING INSTALLATIONS

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation requirements.
- B. Install groups of pipes parallel to each other, spaced to permit applying insulation.
- C. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- D. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- E. Anchor piping for proper direction of expansion and contraction.

### 3.3 HANGERS AND SUPPORTS

- A. Hanger, support, and anchor devices are specified in Division 15 Section "Hangers and Supports." Comply with requirements below for maximum spacing of supports.
- B. Install the following pipe attachments:
  - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
- C. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
  - 1. NPS 3/4: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. NPS 1: Maximum span, 6 feet; minimum rod size, 1/4 inch.
- D. Support vertical runs at roof, at each floor, and at 10-foot intervals between floors.

### 3.4 PIPE JOINT CONSTRUCTION

- A. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for joint construction requirements for soldered and brazed joints in copper tubing.

### 3.5 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
  - 1. Leave joints, including welds, uninsulated and exposed for examination during test.

2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.

END OF SECTION 15181

**SECTION 15400 - PLUMBING****PART 1 - GENERAL****1.1 GENERAL REQUIREMENTS**

- A. The work described herein and on plans is subject to the Supplementary Conditions and General Requirements of the Specifications, and to all conditions of the basic contract documents, and any other provisions in the Owner's contract for this project.
- B. The Plumbing contractor, hereinafter called "Contractor" of "This Contractor", shall provide all materials, equipment and fixtures and shall furnish all labor to provide a complete system as indicated herein. Errors and omissions in this installation shall be corrected at this contractor's expense.

**1.2 PLANS AND SPECIFICATIONS**

- A. Plans and specifications are to be considered as mutually complementary, and requirements of one shall be considered as requirements of both. If conflicting requirements are shown, the most restrictive requirements shall apply. Information given herein and on plans is as complete and as accurate as could be secured at the time of preparation of this design, but complete and timely accuracy cannot be guaranteed.
- B. The intention of the plans and specifications is to provide complete functioning plumbing systems in every respect. This Contractor shall furnish all material and equipment and shall perform all labor to achieve this intent, whether or not such material or equipment is indicated herein.
- C. Architectural, site, structural, electrical, plumbing, and HVAC plans shall be examined by this Contractor prior to submission of proposals to determine systems interface and conditions which could cause interference or deviations in equipment locations, and routing.
- D. Errors or discrepancies on plans or in specifications shall be referred to the Architect prior to submittal of costs to the Owner. Requests for extra costs due to failure to study all plans, and specifications, or to advise of design errors, omissions or interferences prior to bidding shall be denied and Contractor shall complete the installation in an acceptable manner without extra compensation from the owner, the architects, or the engineers.

- E. Routing of pipe and location of equipment, apparatus, fixtures and other devices are shown on plans for general guidance. This contractor shall coordinate his work with other contractors and shall provide necessary deviations in routing and item locations, as far as 10 feet from those shown, as necessary to provide operating systems as specified or implied, without interference and pursuant to these requirements at no additional cost to the Owner, Architect or Engineer.
- F. Dimensions where shown or scaled for roughing-in are for the convenience of this Contractor. Final dimensions are to be obtained from the manufacturers by this Contractor prior to work on this project.

### 1.3 CODES, LAWS, PERMITS AND LABOR PRACTICES

- A. These plans and specifications shall be interpreted in harmony with applicable federal, state, county, city and Fire Underwriters' laws, codes, ordinances, rules, and prevailing labor practices. If conflicts exist, they shall be resolved to provide an installation in accordance with such laws, codes, ordinances, rules, or practices at no extra cost to the Owner or Engineer.
- B. The Architect shall submit plans to proper authorities as required, and this Contractor shall obtain but will not pay for necessary permits and fees. Certificates of Approval, or permits, shall be provided to the Owner as required.
- C. All material and installation work for this project shall be in strict compliance with the 2004 Illinois Plumbing Code. Where the word "Code" appears herein, it refers to that code.

### 1.4 VISIT TO SITE

- A. Prior to submitting the proposal for work under this project, this Contractor shall visit the site to examine all conditions related to his work, and to acquaint himself with these conditions.
- B. This submission of the proposal shall be considered evidence that the contractor has visited and become acquainted with the site. No extra payments will be allowed this Contractor on account of claims for extra work made necessary by failure to visit the site.
- C. This Contractor shall verify that existing, utilities and/or conditions are such that other items and services, in addition to those specified, are required to achieve operating systems as described herein.



**1.5 SPECIFIED EQUIPMENT**

- A. This Contractor shall base the proposal on the use of equipment specified herein.

**1.6 EQUIPMENT LIST AND DRAWING SUBMITTAL**

- A. This Contractor shall submit to the Engineer in accordance with section 01330 copies of manufacturer's equipment drawings and other technical documentation applicable to the work. These drawings shall be submitted for approval and no item of equipment shall be ordered nor any work related to the submitted drawings shall be started until after such approval by the Engineer.
- B. Approval of submitted drawings and documents does not waive the requirements of this specification or the contract.

**1.7 GUARANTEE**

- A. This Contractor shall guarantee all equipment and material furnished under this specification for a period of one (1) year after date of turnover of building to Owner. Equipment manufacturer's warranties shall be passed on to the Owner. Should any defects appear within this period, This Contractor shall repair or replace said defects or any damage to building or contents caused by defective workmanship or equipment, and shall make required immediate adjustments at no cost to the Owner, Architect or Engineer.

**1.8 TEMPORARY WATER SERVICE**

- A. Contractor responsible for any water needs.

**PART 2 - PRODUCTS AND MATERIALS****2.1 SITE SEWER PIPING**

- A. Each pipe shall be laid to the line and grade indicated on the plans and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent offsets in flow line. All pipe shall be laid with the bells uphill.
- B. The sub-grades shall be kept free from water while pipes are being laid. All pipe shall be laid with ends abutting and true to line and grade. They shall be fitted and matched so that they will form a sewer with a smooth and uniform invert.

- C. Each joint shall be cleaned as it is laid, and all bells shall be cleaned before pipes are joined.
- D. PVC plastic pipe shall be joined using solvent welding or neoprene compression seals.
- E. Sewer piping shall be graded 1%.

## 2.2 SEWER APPURTENANCES

- A. This Contractor shall construct all sewer appurtenances as called for in the plans, and in accordance with Code and local Sewer District standards and requirements.

## 2.3 BUILDING SANITARY DRAIN AND VENT PIPING

- A. The arrangement of the system shall be as shown on the drawings, and as direct as possible, avoiding all unnecessary offsets.
- B. Stacks shall be firmly secured in position with clamps.
- C. Piping shall be code approved PVC.
- D. Above ground drain piping shall be the same as underground drain piping, above ground vent piping shall be of the same material as the above ground drain piping.
- E. Piping installation shall conform to good plumbing practices and the Code. Piping shall be installed with a slope of at least 1/8" per foot in the direction of flow for drains, and for vents.
- F. All main vertical soil and waste stacks shall be installed with provision for expansion and shall be extended full size to and above the roofline as vents, except where otherwise specifically indicated.
- G. Vent pipes shall be run with horizontal piping pitched down to stacks without forming traps in pipes.
- H. Where an end of circuit vent pipe from any fixture or line of fixtures is connected to a vent line serving other fixtures, the connection shall be at least 6" above the flood rim of the highest fixtures above the floor on which the fixtures are located.
- I. All changes in sizes of lines shall be made with reducing fittings or recessed reducers. All changes in direction shall be made by the appropriate use of 45 degree Y's, half Y's, long-sweep 1/4 bends, 1/6, 1/8 or 1/16 bends, except that

sanitary tees may be used in soil and waste lines where the change in direction of flow is from the horizontal to the vertical, and on the discharge from water closets. Where it becomes necessary because of space conditions to use short radius fittings in any other location, the approval of the Architect and Plumbing Inspector shall be obtained before they are installed.

- J. Slip joints will be permitted only in trap seals or on the inlet side of the traps. Tucker or hub drainage fittings shall be used for making union connections wherever practicable in connection with dry vents. The use of long screws is prohibited.
- K. Cleanouts shall be placed at ends and all changes in direction of soil and waste pipe whether or not shown, and where required by Code, and brought up to the floor line, where piping is concealed, by means of Y's or suitable bends.
- L. Connections between outlets of fixtures and soil or waste pipe shall be made with Y branches wherever possible. All horizontal soil, waste, and vent pipe shall be grades 1/4" to 1' in direction of drainage. Pipe not buried shall be installed above the ceiling.
- M. The stacks shall be extended through roof of building to points not less than 12" above roof. Extensions through roof shall be made watertight.
- N. Vents extending through the roof shall be a minimum of 10' from any supply fan or fresh-air intake. If necessary the vent shall be offset to meet this requirement.
- O. Cleanouts shall be installed at base of each stack. Concealed cleanouts shall have cast brass chromium plated flat access cover plates.
- P. Cleanouts shall be installed to allow rodding without interference with, or damage to building structure.

## 2.4 WATER SERVICE

- A. Domestic water service outside of building, Coordinate and verify with Division 2 Underground water mains and service lines.

## 2.5 INSIDE DOMESTIC WATER PIPING

- A. Inside water lines shall be code-approved copper tubing, Type L soft annealed below ground, Type M hard temper above ground. Piping shall be installed to provide for expansion and contraction without damage.

- B. All unions in copper lines shall be Mueller "Streamline" ground joints, or equal. Provide dielectric unions where copper lines are connected to steel. Provide unions at each equipment connection.
- C. If dope or cement is used in making up joints, it shall be applied to the male threads only.
- D. All piping shall be installed in the most direct and straight manner possible, with piping running parallel to, or at right angles to, structure and walls.
- E. Care should be taken in routing of piping, and piping shall be coordinated with other trades to assure adequate space for electrical and mechanical installations above ceilings and in walls.
- F. This Contractor shall furnish all valves of one (1) manufacturer, figure, number and type throughout the entire installation of the work, unless otherwise specified. Install gate valves or ball valves at each equipment connection and at other locations shown on plans.
- G. Gate valves 2" and under shall be brass body, brass trim, non-rising stem built for 125# working pressure.
  - 1. 1/2" 72G-1/2
  - 2. 3/4" 72G-3/4
  - 3. 1" 72G-1
  - 4. 1 1/2" SI-S-1 1/2
  - 5. 2" SI-8-2
- H. Ball valves may be used in place of gate valves 2" and smaller. Valves shall be suitable for 125 psi working pressure and shall be NIBCO S-580 or equal.
- I. Joints shall be made using brazing (copper silver or copper phosphorus) if underground, 95-5 (tin-antimony) solder above ground 1" or larger, and lead free "stay-safe 50" or equal solder above ground 3/4" or smaller. All brazing and solder shall be lead free.
- J. All piping shall be installed with proper pitch and bleeder valves installed so that the system may be drained. All lines shall be properly cleaned on the outside.
- K. The piping shall be free of water hammer. Install air chambers full tube size and minimum of 18" long at each fixture. Shock absorbers may be used in place of air chambers.
- L. In addition to valve locations shown on plans, valves shall be installed on each main and each branch off the mains, each piece of equipment, fixture or

fixture group. All items requiring water supply shall be separately valved. All valves shall be located so as to be easily accessible.

- M. This contractor to insure that all water lines which may come into contact with outside temperatures (in attic, exterior wall, etc.) shall receive a minimum 1" thick Manville Mirco-Lok 650 or equal fiberglass insulation with factory applied service jacket with self-sealing tape. Glue in place on pipe with Manville U-Glue.

## 2.6 VACUUM BREAKERS

- A. Vacuum breakers shall be provided at all wall hydrants and hose bibs.
- B. Vacuum breakers shall be as manufactured by Fiat, American Standard, Woodford or Watts.

## 2.7 PIPE SUPPORTS AND SLEEVES

- A. All suspended soil, waste and vent lines shall be supported at the joint with clevis hangers, spaced not greater than 5 feet between hangers.
- B. All horizontal water lines shall be supported on brackets, or hung with copper plated hangers, spaced not greater than center dimensions permitted by the Code. At fixture groups, horizontal pipes shall be hung from long arm riser clamps attached to vent lines.
- C. The use of perforated strap iron hangers will not be permitted.
- D. Each soil, waste and vent stack running vertically shall have a clamp bolted to pipe and resting on solid supports.
- E. Spaces between pipes and sleeves through outside walls, above grade shall be caulked with joint sealant; those below grade shall be caulked with oakum or approved equal and made watertight.

## 2.8 FIXTURES

- A. Fixtures scheduled specified herein shall be set firm and true, connected to all required piping services, ready for use. All fixtures shall be thoroughly cleaned and all paper and dirt removed.
- B. Fixtures included in the specification shall be furnished and installed by this contractor, together with all necessary carriers, hangers, bolts, anchors, and brackets. All fixtures shall be properly connected to drains and supplies and

shall be installed in an absolutely rigid and substantial manner, without damage to any adjoining work or finish.

- C. Vitreous china fixtures shall be of the best quality kiln fired white china, conforming in all respects to Classification "Regular Section" in accordance with the uniform grading rules of the "Vitreous China" fixtures adopted by the Manufacturers' Advisory Committee.
- D. Faucets shall be furnished and installed with union tailpieces for connection to supplies. Clip joints or gasketed joints will not be permitted.
- E. Fixtures shall be independently valved with either integral stops or stops below the fixtures. All fixtures shall have chrome plated brass trimmings.
- F. Items of equipment and plumbing fixtures shall be provided with approved vacuum breakers to prevent backflow, as required by local authorities having jurisdiction. All waste connections shall be installed with approved airbreak fittings to comply with the above requirements.
- G. Detailed plumbing connections shall be roughed-in from actual fixture dimensions.
- H. A resilient sealant shall be set as a filler around base of water closet over finished floor.
- I. Caulking shall be installed around lavatory at interface with walls.
- J. Trim and piping for a complete fixture installation shall be furnished and installed as shown on plumbing and architectural plans.
- K. Similar and equal items by Kohler, American Standard, Toto, Delta, Moen, Acorn & Willoughby will be accepted.
- L. Contractor shall supply to Owner two spare parts kits for each type of plumbing fixture.
- M. Fixtures: Shall be as specified in Plumbing Fixture Schedule Sheet P4-01.

## 2.9 BACKUP PLATES

- A. Where hot, cold and waste piping penetrates chase walls for connections to fixtures, this Contractor shall furnish and install backup plates. Backup plates shall span between and shall be firmly attached to the studs on either side of the fixture. Backup plate shall not be less than 3/4" plywood and shall be attached to the wood stud flange with screws (at least 3 screws on each end). Holes through the backup plates for pipe penetrations shall be accurately

drilled to pipe size to provide a close fit with the pipe. Piping shall be secured to the backup plate.

## 2.10 WALL HYDRANTS

- A. Furnish and install, where shown on the drawings, hydrants, 3/4" threaded, of the freezeless type, model specified on drawings or equal with integral automatic draining anti-siphon vacuum breaker.

## 2.11 PRESSURE REDUCING VALVE

- A. Furnish and install pressure reducing valves where required by Code.
- B. Pressure reducing valves shall be by Watts, Spence, Rockwell or approved equal,

## 2.12 WATER HEATERS

- A. This Contractor shall furnish and install electric water heaters and water heater drain pans as shown on the plan schedule.
- B. Heaters shall be completely factory assembled requiring power, cold water, hot water, and relief valve connections. Heaters shall be N.S.F. approved and U.L. listed. Heaters shall contain A.S.M.E. temperature and pressure relief valve, drain valve, magnesium anode rods, automatic reset immersion thermostat, control panel or junction box containing all contactors, control devices, etc., factory installed and wired, replaceable screw-in heating elements, and fiberglass insulation.
- C. Electric connections shall be by the Electrical Contractor.

## PART 3 - EXECUTION

### 3.1 OBSERVATIONS

- A. The Architect shall be in complete charge of this project and in such capacity, shall have the authority to observe work on this project.
- B. This Contractor shall cooperate in scheduling and participating in these observations.

**3.2 WORKMANSHIP AND MATERIALS**

- A. All work shall be performed in a manner acceptable to the Architect and the Owner, by properly trained, supervised and experienced personnel using new and clean materials, supplies, equipment, hardware and fixtures.

**3.3 VERIFICATION OF ELEVATIONS**

- A. This Contractor shall verify all elevations related to this work. If conflicts exist, this Contractor shall advise the Architect in writing. Installation work shall not commence until verification of elevations and resolution of conflicts.

**3.4 ACCESS**

- A. Equipment, valves and devices shall be mounted in a manner which provides adequate maintenance and inspection access and workspace.

**3.5 MAINTENANCE OF WORK AREAS**

- A. During this project, the Contractor shall maintain this work area in an organized manner, shall not allow debris to accumulate and shall store equipment, tools and supplies in a manner which shall not cause interference with the activities of others engaged on this project.
- B. Open ends of pipe, equipment and specialties shall be kept properly closed during construction and installation so as to avoid contaminations.

**3.6 PROTECTING AND CLEANING**

- A. Equipment, fixtures and trim shall be protected against damage due to building materials, acid, tools and equipment or any causes incidental to construction. The finished surface of each piece of equipment shall be covered with building paper or similar protection. All equipment damaged by any cause, and marred or scratched finish shall be replaced at no cost to the Owner.
- B. Upon completion of this work, this Contractor shall clean all pipe, equipment and fixtures and shall remove all rubbish, crating, unused material and any other debris occasioned by this installation. Contractor shall leave all work in a finished, clean and satisfactory working condition.



**3.7 HOISTING**

- A. This Contractor shall be responsible for hoisting of all materials and equipment furnished under this section of the specifications, in accordance with all city, state and federal rules and regulations.

**3.8 TRENCHING, EXCAVATING AND BACKFILLING**

- A. This Contractor shall make all excavations as required for water service mains, sewers, and outside utilities included in this section of the specifications, and shall backfill all trenches and excavations.
- B. All excavation must be made in such a manner that walls and footings will not be disturbed in any way. All trenches shall be excavated to the required depth and line graded accurately to grade. Excavations below the spring line of sewer pipes shall be taken out so as to conform as nearly as possible to the outside of the pipes and hubs, so that the pipes will be uniformly bedded and supported throughout its entire length.
- C. The building trench outside shall be backfilled to a point 1' above the pipe with fine earth, backfilled in 6" layers; and balance of the trench shall be backfilled with bedding, applied in 1' layers and thoroughly tamped or puddled. No walking or working on installed pipe shall be permitted until the trench has been backfilled to a point at least 2' above the pipe. Care shall be taken to prevent any disturbance of the pipe or damage to newly made joints, and no backfill material shall be allowed to fall directly on the sewer pipe.
- D. All pipes and mains exposed across a trench shall be properly supported by this Contractor.
- E. Contractor shall replace and repair any other services which are damaged or broken during the course of the performance of his work.
- F. Not more than 100' of trench shall be opened in advance of the installation of any sewer or pipe.
- G. The overall width of trenches for sewer lines shall not exceed the outside diameter of the pipe, plus 16" at a point 1' above the top of the pipe.
- H. In carrying out excavations, the sides of all trenches and excavations shall be securely held. Bracing and sheathing shall be used where necessary, and shall be removed in units as the level of the backfill reaches an elevation where such units can be removed.
- I. Where drain lines pass through foundation walls, they shall be enclosed in approved thimbles with at least 1" clearance around pipes, and packed with

waterproof mastic. Where lines run under foundation walls, they shall clear such walls by at least 2".

- J. All piping cleanouts, runouts, etc., below floor shall be put in place and tested before backfilling.
- K. Inspections shall be accomplished before covering sewers and water piping below floor or grade. Architect shall be advised of scheduled date of inspections.

### **3.9 STERILIZING AND TESTING**

- A. Soil, waste and vent piping shall be tested at 10' head for 15 minutes using water. If leaks are detected, they shall be repaired and tests shall be repeated.
- B. Water lines shall be pressure tested for 24 hours at 125 psi using water or air. If leaks are detected, they shall be repaired and test shall be repeated.
- C. Potable water lines shall be sterilized. Entire system shall be flushed with clean water until discharge water at all outlets is clear. The entire system shall be filled with water-chlorine solution of at least 50 parts per million chlorine, valved off, and allowed to be undisturbed for 24 hours; or the entire system shall be filled with 200 parts per million chlorine and allowed to be undisturbed for three (3) hours.
- D. All testing shall be in the presence of the Owner's inspector. This Contractor shall advise the Architect of the scheduled time of the tests and sterilization.

### **3.10 BALANCING AND ADJUSTING**

- A. This Contractor shall operate all of the fixtures and valves of the system and shall make adjustments to provide a balanced system.

**END OF SECTION 15400**

**SECTION 15475 – FOUNTAIN MECHANICAL SYSTEM****PART 1 - GENERAL****1.1 GENERAL CONDITIONS**

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

**1.2 SCOPE OF WORK**

- A. Work included in this Section:
  - 1. Fountain mechanical systems work shall include the furnishing of all labor, materials, tools, equipment, apparatus, services and other items are required for the complete installation of the fountain mechanical systems together with all miscellaneous items of labor and materials required for the proper operation and control of all such fountain mechanical systems.
- B. Work related by other disciplines:
  - 1. Civil drawings/specifications.
- C. These requirements shall apply to all mechanical work involved in fully completing the project in accordance with the drawings, specifications, and building codes to which they may be applicable.

**1.3 CONTRACTOR QUALIFICATIONS**

- A. Contractor shall have at least five years of similar experience in installing fountain mechanical systems. Contractor shall submit a reference list containing not less than five previous projects of similar size and scope to the Owner's Authorized Representative for review. This list shall contain recently constructed projects complete with location, description and a telephone number of a responsible contact person. If the Owner's Authorized Representative feels that in his opinion the references do not meet the qualifications expected for the project, rejection of Contractor may be made.

**1.4 SHOP DRAWINGS**

- A. The Contractor shall submit complete shop drawings for each fountain mechanical system. These drawings shall be based upon the diagrammatic plans furnished in the Contract Documents, together with any additional information deemed necessary by the Contractor which would assist in showing the proper installation of all required fountain mechanical equipment.
- B. Shop drawings shall indicate the intended routing of all mechanical piping, valves, pump room layout, hangers, clean outs, and other pertinent information necessary to execute the installation of the fountain mechanical system. Shop drawings shall include details for structural slab penetrations manifold connections from the fountain pumps to the single water supply line supplied to the fountain equipment room, backwash/wastewater to floor sink connection, centerline elevations of proposed core holes through the structure to facilitate pipe placement and elevation of fountain equipment room wall receiving piping.
- C. Any core holes by the Contractor in the routing of his piping must first be reviewed and approved by the Owner's Authorized Representative.
- D. Routing of piping should be laid out in straight runs and be confined to trapezoid hangers wherever possible. Coordinate pipe runs with electrical conduit runs to minimize hangers.

#### 1.5 PROTECTION OF OWNER'S PROPERTY

- A. The Contractor shall be responsible for the protection of the Owner's property from injury or loss due to the Contractor's work. All damage to buildings, utilities, fountain construction or to irrigation or planting areas caused by the Contractor during his operation or as a result of malfunction of installed work during the guarantee period shall be repaired at the Contractor's expense.

#### 1.6 DRAWINGS AND SPECIFICATIONS

- A. Drawings for this work consist of a set of plans, detail drawings, and diagrams. Other drawings may be added by the Landscape Owner's Authorized Representative during the period of construction, as required for clarification of proper installation of the fountain mechanical equipment.
- B. The Drawings are essentially diagrammatic, intended mainly to indicate the scope of work to be done. Equipment and material locations may be distorted for clearness in presentation.
- C. The Contractor shall fully inform himself regarding any available space limitations and unusual requirements, for the installation of all materials and work furnished under this Section. Although the location of equipment may be shown on the drawings in certain positions, the Contractor shall also be guided by the Owner's Authorized Representative details and conditions at the job, correlating his work with that of the other trades.

- D. Questions pertaining to work that does not appear to be sufficiently detailed or explained, or pertaining to the true meaning of any part of the drawings or specifications, or discrepancies found existing in or between the specifications and the drawings, shall be referred to the Owner's Authorized Representative for clarification.

### **1.7 RULES, REGULATIONS, ORDINANCES, AND CODES**

- A. All workmanship and materials shall conform and comply with the requirements of building ordinances, codes, rules and regulations, of all departments and bureaus of the County, City and State, having lawful jurisdiction over the work in this Section.
- B. When these specifications and drawings call for or describe materials, workmanship, or construction of a better quality, higher standard, or larger size than is required by the above mentioned rules and regulations, the provisions of these specifications and drawings shall take precedence over the requirement of said rules and regulations.
- C. The Contractor shall furnish, without extra charge to the Owner, any additional material or labor, or both, required for compliance with these rules and regulations, although not mentioned in these specifications or indicated on the drawings.

### **1.8 STANDARDS FOR MATERIALS AND WORKMANSHIP**

- A. All materials shall be new and shall conform with applicable standards in every case where such standards have been established for the particular material in question.
- B. All work shall be executed by workmen skilled in the craft to which they are assigned.
- C. Adequate supervision shall be provided to maintain high quality workmanship. The work shall present a neat appearance when complete.

### **1.9 MATERIALS**

- A. Only material of the same physical dimensions, type, grade, function, appearance and quality as the equipment specified may be considered for substitution and only upon written approval by the Owner's Authorized Representative.
- B. The Contractor shall furnish necessary materials in ample quantities as required to avoid delay in the progress of the work and shall prevent interference with other trades' work.

- C. Any material supplied by the fountain equipment supplier that is not manufactured by the fountain equipment supplier shall be supplied under the name of the particular equipment manufacturer's name.

#### **1.10 FOUNTAIN EQUIPMENT SUPPLIER**

- A. All fountain equipment specified in Part 2 of this Section shall be supplied by a single fountain equipment supplier unless otherwise specified herein.
- B. The fountain equipment supplier must currently be in the business of supplying fountain equipment and shall have previously supplied fountain equipment, similar in size and
- C. The fountain equipment supplier shall also provide Owner's Authorized Representative design as it pertains to the fountain system and the equipment supplied, referring specifically to complete hydraulic design. This shall include fountain system, filtration system, water level control system, pump selection and pump pit, piping system sizing, suction pit and sump design.
- D. The Owner's Authorized Representative design information shall further be delineated on final schematic, installation, and detail drawings showing the proper installation of the fountain equipment supplier's equipment. These drawings shall be furnished by the fountain equipment supplier as an integral part of his fountain mechanical equipment package. Preliminary drawings shall not be used for installation.
- E. The fountain equipment supplier shall prepare and furnish three (3) copies of a fountain Operation and Maintenance Manual indicating procedures for all three fountain functions and equipment, a troubleshooting guide, manufacturer's replacement parts lists, and system piping. Manuals shall be bound in a three-ring water-resistant binder.

#### **1.11 FOUNTAIN EQUIPMENT SUPPLIER'S RESPONSIBILITY**

- A. All materials and components supplied by the fountain equipment supplier shall be guaranteed to be free from defects of materials and workmanship for one year from the date of fountain start up and acceptance by the Owner's Authorized Representative.
- B. Design Responsibility
  - 1. The fountain equipment supplier shall accept complete design responsibility for the fountain mechanical systems, provided that all equipment listed under Part 2 of this specification is supplied by the Fountain Equipment Supplier.
- C. Performance Guarantee

1. The fountain equipment supplier shall provide a written performance guarantee certifying that the fountain systems will perform to the designed water heights and patterns provided that the equipment is supplied by a single fountain equipment supplier and the installation is in accordance with the supplier's recommendations and drawings.

#### **1.12 SUBSTITUTIONS**

- A. Substitutions shall be made only with the written approval of the Owner.
- B. Contractor desiring to substitute the specified items shall submit the following data for review:
  1. A complete fountain system isometric schematic to include a complete bill of materials.
  2. A written description of the fountain's operational cycle.
  3. Specification cuts of all components.
  4. A written performance guarantee certifying that the alternate system will produce the specified water effects.

#### **1.13 FOUNTAIN EQUIPMENT**

- A. Verify that adequate ventilation has been provided by previous trades to allow for the proper ventilation of the fountain pumping and filtering equipment before commencing with the work.
- B. Verify that the pressurized City water supply point of connection in the fountain equipment room is Type K copper and is protected by an approved backflow preventer and pressure reduction valve has been provided by other trades.
- C. Verify that adequate drainage provisions have been made by previous trades to prevent to prevent flooding of the fountain equipment room before commencing with the work.
- D. Verify that adequate drain provisions were made by previous trades for the removal of wastewater resulting from filter backwashing and normal fountain maintenance procedures before commencing with the work.
- E. Adequate housekeeping pads and/or grating shall be provided to elevate mechanical equipment a minimum of four inches above the fountain equipment room floor to prevent contact with standing water.

#### **1.14 START UP SERVICE**

- A. A factory technician from the fountain equipment supplier shall be provided to inspect final fountain mechanical equipment installation for all fountains

(maximum one day to be combined with review of the fountain electrical systems) to start up the fountain systems and to assist in all necessary adjustments to visual water effects and fountain systems and to provide training of the Owner's fountain maintenance personnel.

#### **1.15 COOPERATION AND COORIDNATION**

- A. The Contractor shall cooperate with subcontractors of other trades, whose work is in any way affected by, or affects the work under this section.
- B. The Contractor shall also coordinate the work under this section with that of other trades, as required, to effect a completely satisfactory installation consistent with the requirements and intent of the drawings and specifications and to avoid omissions and delays in the work.

#### **1.16 PROJECT RECORD DRAWINGS**

- A. Project Record Drawings shall be provided showing the completed fountain.
- B. Project Record Drawings shall record the location of all concealed services, piping, cleanouts, conduit and other equipment, by indication of measured dimensions to each such line, from readily identifiable and accessible reference points.

#### **1.17 DEFECTIVE WORK AND MATERIALS**

- A. Materials or work found to be defective or not in conformity with the drawings, or different from the requirements of the drawings and specifications, or defaced or injured, shall be removed and satisfactory material and work substituted.

#### **1.18 TEST AND ADJUSTMENTS**

- A. The Contractor shall test all equipment installed by him, as necessary; to show that it complies with all requirements specified. Testing shall be done in a manner approved by the Owner's Authorized Representative. All water piping systems shall be pressure tested and proved free of leaks or other defects.
- B. The Contractor shall, at his expense, place the fountains in operating, using an authorized technician from the fountain equipment supplier and make tests, adjustments, and corrections, until it is shown to be in proper operating condition.
- C. The Contractor shall, at his expense, operate, maintain, and monitor the fountains operation for a minimum of 30 day period or until such time that the foun-



tains have been proven to the Owner's Authorized Representative that the fountains can operate for a 30-day period without requiring adjustments or corrections. During this trial period, the Contractor shall be responsible for all operating costs including chemicals required to test and maintain proper water chemistry.

### **1.19 MAINTENANCE MANUALS**

- A. The Contractor shall deliver to the Owner's Authorized Representative three copies of the Operations and Maintenance Manual for the operation and maintenance of all fountains, furnished by the fountain equipment supplier, together with any additional information or manuals which would assist in the proper maintenance of the fountains mechanical equipment.
- B. The Contractor shall arrange and provide for technical instruction of the Owner's fountain maintenance personnel, by the fountain equipment supplier's personnel, for such time as is reasonably required to acquaint them with the operation and maintenance of all fountain equipment furnished for installation under this section.

### **1.20 APPLICABLE CODES AND STANDARDS**

- A. All fountain mechanical work shall comply with the UBC and UPC, and shall comply with the applicable standards of ASTM, ASME, and NSF, and Illinois Plumbing Code.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Equipment not listed within these specifications or on drawings as furnished by the fountain equipment supplier but required for the complete installation of the fountain mechanical systems shall be furnished by the Contractor. This equipment includes, but is not limited to pipe, valves, hangers, drain fittings, special equipment for membrane penetrations and filter media, unless otherwise specified.

### **2.2 FOUNTAIN MECHANICAL EQUIPMENT**

- A. Furnish and install the fountain mechanical equipment as specified on Sheet PA3-04 for the following:
  - 1. Water wall.
  - 2. Compass fountain.

### 2.3 PIPING MATERIALS

- A. Piping located within the fountains and all stub-ups through the fountain floors shall be red brass pipe or Type K copper tubing of full hard temper.
- B. Fittings used with the above piping shall be bronze or copper.
- C. Interconnecting piping and fittings between the fountains and the fountain equipment room – Room P109 – shall be Type L copper and to be installed in accordance with the manufacturer's recommendations.
- D. Piping and fittings in the fountain equipment room – Room P109 – shall be Type L copper and to be installed in accordance with applicable local codes and manufacturer's recommendations.
- E. Connections between dissimilar metals shall be made with dielectric fittings.
- F. Piping and fittings shall comply with standard ASTM specifications for their respective materials.

### 2.4 FIBERGLASS SURGE TANK

- A. Fiberglass tank shall be as detailed on Sheet PA3-04 installation per manufacturer's recommendations.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Install all equipment specified herein and/or on the drawings in accordance with the shop drawings and equipment supplier or manufacturer's instructions and recommendations unless otherwise noted.

### 3.2 PIPE ASSEMBLY

- A. Piping shall be installed straight and true in accordance with the best modern practice. It shall be sloped to the pump for drainage and shall be free of traps or loops, which could trap air or water. If piping cannot be sloped to pump, it shall be sloped to an accessible sump in pool and provided means for complete draining at that point.
- B. Pipe runs shall be made as direct as possible using a minimum number of fittings.
- C. Pipe shall be accurately cut to fit. Bending or springing of pipe will not be permitted.

- D. Pipe ends shall be square cut and shall be thoroughly reamed or filed and wiped clean to remove all burrs prior to joining.
- E. Pump and/or filter suction lines shall be a straight run into the pump as shown on the drawings.
- F. Pump suction reductions, four inches or larger, shall be made with eccentric design fittings.
- G. Screwed joints shall be made tight with tongs and wrenches.
- H. Solder joints for copper tubing shall be made with non-corrosive paste flux and solder approved for application. Solder must be lead free.
- I. Glued socket joints for PVC shall be made using the manufacturer's recommendations.
- J. Underwater and/or buried flanged connections shall be made using minimum 316 grade stainless steel bolts, nuts, and washers.
- K. Unions or flanged connections shall be installed on at least one side of all check valves, solenoid valves, and control valves and further be installed at all equipment locations (pump, filter, etc.) so that such equipment may be readily disconnected.

### 3.3 THERMAL EXPANSION

- A. Swing joints, turns, expansion loops or long offsets shall be provided wherever shown on plans or whenever necessary to allow for proper expansion and contraction of piping.

### 3.4 NOISE AND VIBRATION

- A. Piping, equipment, and systems shall be installed with the utmost precautions to prevent noise and vibration transmission.
- B. Equipment that would cause noise or vibration shall be isolated with suitable vibration isolators to reduce noise or vibration transmission to buildings and/or other equipment. Piping connected to this equipment shall also be isolated.

### 3.5 PIPE LAYING

- A. The Contractor shall do all sheathing and bracing specified, indicated on the drawings, and/or as required for the installation of the work under this section.

**3.6 PIPE SUPPORTS**

- A. The Contractor shall furnish all foundation supports, structural supports, pipe supports, or pipe hangers specified herein, indicated on the drawings or that may be required to support all piping, unless otherwise specified.
- B. Hangers for piping shall be clevis or split ring type with provisions for vertical adjustment, unless otherwise specified or indicated. Hangers for copper tubing shall further be brass or bronze.
- C. Piping shall be supported to maintain the required grade and slope, to prevent vibration and to secure piping in place and shall be arranged so as to provide for expansion and contraction.
- D. Flanged and threaded piping connections to equipment shall not be allowed as piping supports and/or braces and no external loading on these connections is permitted.

**3.7 SLEEVES, PLATES AND WATERSTOP FLANGES**

- A. The Contractor shall furnish all sleeves, plates and/or waterstop flanges as specified herein, shown on the drawings or required for openings in concrete slabs, walls, ceilings and floors.
- B. Sleeves through below grade exterior building surfaces shall be caulked and waterproofed as noted on the drawings.
- C. In areas where there is membrane waterproofing, the sleeves for supply piping shall be bonded to the membrane using adhesives to be selected and applied in accordance with the membrane manufacturer's recommendations, and/or a flashing ring or clamping ring.
- D. In areas where piping and/or fountain fittings penetrate the fountain pool walls or floors below the normal waterline, waterstop flanges shall be utilized to prevent leakage through concrete at point of penetration.

**3.8 CLEANOUTS**

- A. Cleanouts shall be provided as specified herein, indicated on the drawings or as required for conformance with governing codes and/or standard trade practices.

**3.9 PIPE CODING**

- A. Piping shall be marked in an approved manner as to service, characteristics and direction of flow.

**3.10 ISOLATION AND FLOW CONTROL VALVES.**

- A. Valves required for isolation and flow control are to be located in an accessible position or made accessible. Where several valves are related as to function, they shall be grouped together wherever possible or as indicated on the drawings.

**3.11 CHECK VALVES**

- A. Check valves shall be used on pump or filter discharge lines terminating at air induction type nozzles or at below-surface discharge points. Check valves shall also be used as required for proper operation of the fountain system.

**3.12 VALVE IDENTIFICATION**

- A. Valves shall be numbered with a permanently attached tag of non-corrosive material with engraved or raised letters and/or numbers of ½-inch minimum height.

**3.13 CLEANUP**

- A. Upon completion of the work of this section, the Contractor shall remove all used equipment and implements of service, and leave the entire area involved in a neat, clean, and Owner's Authorized Representative-acceptable condition.
- B. Soiled, abraded or discolored surfaces of decorative fountain work shall be cleaned, polished and left free from blemishes and defects.
- C. Water pipelines shall be flushed free of debris.

**END OF SECTION 15475**

**SECTION 15672 - CONDENSING UNITS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Section includes air-cooled condensing units.

**1.2 SUBMITTALS**

- A. Product Data: For each condensing unit, include rated capacities, operating characteristics, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.
- B. Field quality-control test reports.
- C. Operation and Maintenance Data: For condensing units to include in emergency, operation, and maintenance manuals.
- D. Warranty: Specified in this Section.

**1.3 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**1.4 COORDINATION**

- A. Coordinate size and location of concrete bases.
- B. Coordinate location of piping and electrical rough-ins.

**1.5 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Compressor failure.

- b. Condenser coil leak.
2. Warranty Period: Standard five year limited warranty, from date of Substantial Completion.
3. Warranty Period: Five year limited warranty on compressor, from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### **2.2 CONDENSING UNITS, AIR COOLED, 1 TO 5 TONS**

- A. Manufacturers:
  1. Carrier Corporation; Carrier Air Conditioning Div.
  2. Lennox Industries Inc.
  3. Trane Co. (The); Worldwide Applied Systems Group.
  4. York International Corp.
  5. Rheem Mfg.
  6. Ruud Air Conditioning.
  7. Tempstar Heating & Cooling Products.
- B. Description: Factory assembled and tested, minimum standard 10 SEER rating, consisting of compressor, condenser coil, fan, motors, refrigerant reservoir, and operating controls.
- C. Compressor: Scroll, hermetically sealed, with rubber vibration isolators.
  1. Motor: Single speed, and includes thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
  2. Accumulator: Suction tube.
- D. Condenser Coil: Seamless copper-tube, aluminum-fin coil; circuited for integral liquid subcooler, with removable drain pan and brass service valves with service ports.
- E. Condenser Fan: Direct-drive, aluminum propeller fan; with permanently lubricated, totally enclosed fan motor with thermal-overload protection and ball bearings.

- F. Accessories:
  - 1. Electric 7-day programmable thermostat to control condensing unit and evaporator fan.
  - 2. Filter-dryer.
  - 3. High-Pressure Switch: Automatic-reset switch cycles compressor off on high refrigerant pressure.
  - 4. Low-Pressure Switch: Automatic-reset switch cycles compressor off on low refrigerant pressure.
  - 5. Crankcase heater.
  
- G. Unit Casing: Galvanized steel, finished with baked enamel; with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Mount service valves, fittings, and gage ports on exterior of casing.

### 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate condensing units according to ARI 210/240.
  - 1. Coefficient of Performance: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
  
- B. Test and inspect shell and tube condensers according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  
- C. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of condensing units.
  
- B. Examine roughing-in for refrigerant piping systems to verify actual locations of piping connections before equipment installation.
  
- C. Examine grade for suitable conditions where condensing units will be installed.
  
- D. Proceed with installation only after unsatisfactory conditions have been corrected.



### 3.2 INSTALLATION

- A. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
- B. Install condensing units on pre-cast concrete bases.
- C. Maintain manufacturer's recommended clearances for service and maintenance.
- D. Loose components: Install components, devices, and accessories that are not factory mounted.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories. Refrigerant piping and specialties are specified in Division 15 Section "Refrigerant Piping."
- D. Ground equipment according to Division 16 Section "Grounding."
- E. Connect wiring according to Division 16 Section "Conductors and Cables."

### 3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Perform electrical test and visual and mechanical inspection.
  - 2. Leak Test: Evacuate entire refrigerant system with a vacuum pump to a vacuum of 500 micrometers. If vacuum holds for 12 hours, system is ready for charging. Repair any leaks and retest until no leaks exist.
  - 3. Break vacuum with refrigerant gas, allowing pressure to build up to 2 psig.
  - 4. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
  - 5. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 6. Verify proper airflow over coils.
- B. Remove and replace malfunctioning condensing units and retest as specified above.

**3.5 STARTUP SERVICE**

- A. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
  - 1. Inspect for physical damage to unit casing.
  - 2. Verify that access doors move freely and are weather tight.
  - 3. Clean units and inspect for construction debris.
  - 4. Verify that all bolts and screws are tight.
  - 5. Verify that controls are connected and operational.
- B. Lubricate bearings on fans.
- C. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
- D. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
- E. Measure and record airflow over coils.
- F. Verify proper operation of condenser capacity control device.

**END OF SECTION 15672**

**SECTION 15738 - SPLIT-SYSTEM AIR-CONDITIONING UNITS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes split-system air-conditioning unit consisting of separate evaporator-fan and compressor-condenser components. Units are designed for wall mounting in elevator equipment room.

**1.3 SUBMITTALS**

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

**1.4 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: One year parts, five years compressor from date of Substantial Completion.

**1.5 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Filters: One set of filters for each unit.
  2. Fan Belts: One set of belts for each unit.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Carrier Air Conditioning; Div. of Carrier Corporation.
  2. First Co.
  3. Friedrich Air Conditioning Company.
  4. Lennox Industries Inc.
  5. Mitsubishi Electronics America, Inc.; HVAC Division.
  6. Sanyo Fisher (U.S.A.) Corp.
  7. Trane Company (The); Unitary Products Group.
  8. York International Corp.

**2.2 WALL-MOUNTING, EVAPORATOR-FAN COMPONENTS**

- A. Cabinet: Enameled steel with removable panels on front and ends and discharge drain pans with drain connection.
- B. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
- C. Fan: Direct drive, centrifugal fan.
- D. Filters: Permanent, cleanable.

**2.3 AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS**

- A. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.

- B. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
  - 1. Compressor Type: Reciprocating or Scroll.
  - 2. Manual-reset high-pressure switch and automatic-reset low-pressure switch.
- C. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
- D. Fan: Aluminum-propeller type, directly connected to motor.
- E. Motor: Permanently lubricated, with integral thermal-overload protection.

## 2.4 ACCESSORIES

- A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
  - 1. Compressor time delay.
  - 2. 24-hour time control of system stop and start.
  - 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
  - 4. Indoor coil freeze protection.
- B. Automatic-reset timer to prevent rapid cycling of compressor.
- C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground mounting, compressor-condenser components on 4-inch- thick, concrete base; 4 inches larger on each side than unit.
- D. Install stainless steel concrete anchors and screws.

- E. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

### 3.2 CONNECTIONS

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Electrical Connections: Comply with requirements in Division 16 Sections for power wiring, switches, and motor controls.

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections.
- B. Perform the following field tests and inspections:
  - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

### 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.

**END OF SECTION 15738**

**SECTION 15765 - WALL AND CEILING HEATERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes wall heaters with propeller fans and electric heating elements.

**1.3 SUBMITTALS**

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 1. Plans, elevations, sections, and details.
  - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Structural members to which wall and ceiling heaters will be attached.
  - 2. Method of attaching hangers to building structure.
- D. Samples for Initial Selection: Finish colors for units with factory-applied color finishes.
- E. Samples for Verification: Finish colors for each type of wall and ceiling heater indicated with factory-applied color finishes.
- F. Field quality control test reports.

- G. Operation and Maintenance Data: For wall and ceiling heaters to include in emergency, operation, and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURED UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Berko Electric Heating; a division of Marley Engineered Products.
  - 2. Chromalox, Inc.; a division of Emerson Electric Company.
  - 3. Indeeco.
  - 4. Markel Products; a division of TPI Corporation.
  - 5. Marley Electric Heating; a division of Marley Engineered Products.
  - 6. QMark Electric Heating; a division of Marley Engineered Products.
- B. Description: An assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.
- C. Cabinet:
  - 1. The cabinet shall be of heavy-duty 16-gauge cold-rolled steel. The heater front cover shall be securely attached to the cabinet with a maximum of two slotted head style spring latches with optional Toolhead Key Lock and easily removable for access to elements, filters, and control panel. Cabinet shall be finished in (Color by Architect) baked enamel.
- D. Surface-Mounting Cabinet Enclosure: Steel with finish to match cabinet.
- E. Heating Elements: The heating elements shall be warranted for five years and shall be of non-glowing design consisting of 80-20 NiChi resistance wire enclosed in a steel sheath to which steel plate fins are brazed. . The heating element shall be located directly in front of the blower discharge air for uniform heating.
- F. Safety Thermal Cutouts: Thermal safety cutouts shall be built into the system to automatically shut off heater in event of overheating due to any cause. The



safety cutouts shall directly interrupt power to the elements and do not depend on relays to interrupt the power.

- G. Motor and Blower Assembly: The motor and blower shall be direct drive and resiliently mounted on a rigid heavy gauge frame for quiet operation and long life. The motor shall be two speed 1/8 H.P. with automatic reset overload protection. The motor shall be vented and mounted in the airstream to provide maximum cooling of the motor. Motor fuse protection shall be provided to meet UL, cUL and NEC requirements. The blower shall be forward curved, double inlet, centrifugal type with discharge directly on the full length of the elements to provide uniform discharge air temperatures.
- H. Air Filters: The filter shall be located ahead of the motor and blower assembly to assure clean air circulation. The filter shall filter returning room air. Filter shall be easily removed for changing or cleaning by removing the front panel and pulling on the filter. A permanent washable filter is to be provided.
- I. Fan Delay Control: Fan control shall delay fan start-up of the fan motor(s) until the heating elements have warmed up. It shall maintain motor operation after heating elements have been de-energized to dissipate residual heat.
- J. Temperature Control: Thermostat shall be built-in, snap-action single stage with remote bulb sensor located in the return air stream. Silent time delay relays shall be provided, rather than contactors, to eliminate the noise of contactor opening and closing.
- K. Capacities and Characteristics:
  - 1. Airflow: 230 low/250 high.
  - 2. Heating Coil: 3kW.
  - 3. Electrical Characteristics for Single-Point Connection:
    - a. Volts: 208.
    - b. Phase: 3.
    - c. Hertz: 60.
    - d. Full-Load Amperes: 9.
- L. Airflow: Upflow.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine areas to receive wall and ceiling heaters for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine roughing-in for electrical connections to verify actual locations before wall and ceiling heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION**

- A. Install wall boxes in finished wall assembly.
- B. Install wall and ceiling heaters to comply with NFPA 90A.

### **3.3 CONNECTIONS**

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."

### **3.4 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 2. Operate electric heating elements to verify proper operation and electrical connections.
  - 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace malfunctioning units and retest as specified above.

### **3.5 ADJUSTING**

- A. Adjust initial temperature set points.

**END OF SECTION 15765**

**SECTION 15767 - PROPELLER UNIT HEATERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and the Supplemental Specifications, latest editions, and other Division 1 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. This Section includes propeller unit heaters with electric-resistance coils.

**1.3 SUBMITTALS**

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each unit type and configuration.
- B. Shop Drawings: Submit the following for each unit type and configuration:
  - 1. Plans, elevations, sections, and details.
  - 2. Details of anchorages and attachments to structure and to supported equipment.
  - 3. Wiring Diagrams: Power, signal, and control wiring.
  - 4. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
- C. Coordination Drawings: Plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which unit heaters will be attached.
  - 3. Other items, including the following:
    - a. Lighting fixtures.
    - b. Sprinklers.
- D. Field quality-control test reports.

- E. Operation and Maintenance Data: For propeller unit heaters to include in emergency, operation, and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Markel Products.
  2. Chromalox, Inc.
  3. Indeeco.
  4. Marley.
  5. QMarkg.

#### 2.2 UNIT HEATERS

- A. Description: An assembly including casing, coil, fan, and motor in horizontal discharge configuration with adjustable discharge louvers.
- B. Comply with UL 2021.
- C. Comply with UL 823.

#### 2.3 CASING

- A. Cabinet: Removable panels for maintenance access to controls.
- B. Cabinet Finish: Manufacturer's standard baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.
- C. Discharge Louver: Adjustable fin diffuser for horizontal units.

## 2.4 ELECTRIC-RESISTANCE HEATING ELEMENTS

- A. Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-resistant metallic sheath with fins no closer than 0.16 inch. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed 550 deg F at any point during normal operation.
  - 1. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters.
  - 2. Wiring Terminations: Stainless steel or corrosion-resistant material.

## 2.5 FAN

- A. Propeller type, aluminum wheel directly mounted on motor shaft in the fan venturi.

## 2.6 FAN MOTORS

- A. Comply with requirements in Division 15 Section "Motors."
- B. Motor Type: Permanently lubricated.

## 2.7 CONTROLS

- A. Control Devices:
  - 1. Wall-mounting thermostat.

## 2.8 CAPACITIES AND CHARACTERISTICS

- A. Electric Coil:
  - 1. Heating Capacity: 3.3 KW.
  - 2. Number of Steps: 1.
- B. Electrical Characteristics for Single-Point Connection:
  - 1. Volts/Phase/Hertz: 208/3/60.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine areas to receive propeller unit heaters for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before propeller unit-heater installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Install propeller unit heaters level and plumb.
- B. Install propeller unit heaters to comply with NFPA 90A.
- C. Hanger rods and attachments to structure are specified in Division 15 Section "Hangers and Supports."
- D. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls.

**3.3 CONNECTIONS**

- A. Ground equipment according to Division 16 Section "Grounding and Bonding."
- B. Connect wiring according to Division 16 Section "Conductors and Cables."

**3.4 FIELD QUALITY CONTROL**

- A. Testing: Perform the following field quality-control testing and report results in writing:
  - 1. After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
  - 3. Test and adjust controls and safeties.
- B. Remove and replace malfunctioning units and retest as specified above.

**3.5 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain propeller unit heaters. Refer to Division 1 Section "Demonstration and Training."

**END OF SECTION 15767**

**SECTION 15838 – POWER VENTILATORS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. In- line centrifugal fans.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 16 Section "Disconnects and Circuit Breakers" for disconnect switches.
  - 2. Division 16 Section "Motor Controllers" for motor starters.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Operating Limits: Classify according to AMCA 99.
- B. Fan Unit Schedule: The following information is described in an equipment schedule on the Drawings.
  - 1. Fan performance data including capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.

**1.4 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data including rated capacities of each unit, weights (shipping, installed, and operating), furnished specialties, accessories, and the following:



1. Certified fan performance curves with system operating conditions indicated.
  2. Certified fan sound power ratings.
  3. Motor ratings and electrical characteristics plus motor and electrical accessories.
  4. Material gages and finishes, including color charts.
  5. Dampers, including housings, linkages, and operators.
- C. Coordinate the following:
1. Ceiling suspension assembly members.
  2. Size and location of initial access modules for acoustical tile.
  3. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- D. Wiring diagrams detailing wiring for power and control systems and differentiating clearly between manufacturer-installed and field-installed wiring.
- E. Maintenance data for power ventilators to include in the operation and maintenance manual specified in Division 1 and in Division 15 Section "Basic Mechanical Requirements."

## 1.5 QUALITY ASSURANCE

- A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.
- B. AMCA and NEMA Compliance: Provide products that meet performance requirements and are licensed to use the AMCA Seal and applicable NEMA standards.
- C. UL Standard: Provide power ventilators that comply with UL 705.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements. Verify clearances.
- B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

## 1.7 COORDINATION AND SCHEDULING

- A. Coordinate the size and location of structural steel support members.

**1.8 EXTRA MATERIALS**

- A. Furnish one set of belts for each belt-driven fan that match products installed, are packaged with protective covering for storage, and are identified with labels clearly describing contents.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. In-Line Centrifugal Fans:
    - a. Cook (Loren) Co.
    - b. Greenheck Fan Corp.
    - c. Penn Ventilation.
    - d. Carnes Co.

**2.2 IN-LINE CENTRIFUGAL FANS**

- A. Description: In-line, belt-driven centrifugal fan consisting of a square housing, wheel, fan shaft, bearings, motor and disconnect switch, mounting brackets, and accessories.
- B. Housing: 18 gauge steel with integral duct collars. Bolted access doors shall be provided on three sides, sealed with closed cell neoprene gasketing. Finish shall be baked powder coating.
- C. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing.
- D. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
- E. Accessories: The following accessories are required as indicated:
  - 1. Model "RC" ceiling vibration isolator.
  - 2. Flexible duct connectors.
  - 3. Belt guard.
  - 4. Pre-wired Disconnect switch.

**2.3 MOTORS**

- A. Refer to Division 15 Section "Motors" for general requirements for factory-installed motors.
- B. Motor Construction: NEMA MG 1, general purpose, continuous duty, Design B.
- C. Enclosure Type: The following features are required as indicated:
  - 1. Open dripproof motors where satisfactorily housed or remotely located during operation.
  - 2. Guarded dripproof motors where exposed to contact by employees or building occupants.

## 2.4 CONTROLS

- A. Exhaust fan, EF-2, shall have timer control with 20 minute (adjustable) delayed shut off and be interlocked with lights. When light switch is turned on, exhaust air louver, L-3 shall open and EF-2 shall activate. After 20 minutes (adjustable), EF-2 shall deactivate and louver, L-3, shall close.

## 2.5 SOURCE QUALITY CONTROL

- A. Testing Requirements: The following factory tests are required as indicated:
  - 1. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements of installation tolerances and other conditions affecting performance of the power ventilators. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install power ventilators according to manufacturer's written instructions.

- B. Support units using the vibration-control devices indicated. Vibration-control devices are specified in Division 15 Section "Vibration Control."
  - 1. Suspend units from structural steel support frame using threaded steel rods and vibration isolation springs.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in Division 15 Section "Mechanical Identification."

### **3.3 CONNECTIONS**

- A. Duct installation and connection requirements are specified in other Division 15 Sections. Drawings indicate the general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.
- B. Electrical: Conform to applicable requirements in Division 16 Sections.
- C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### **3.4 FIELD QUALITY CONTROL**

- A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly of components and installation of fans, including duct and electrical connections, and to report results in writing.

### **3.5 ADJUSTING**

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.

### **3.6 CLEANING**

- A. After completing installation, inspect exposed finish. Remove burrs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- B. Clean fan interiors to remove foreign material and construction debris. Vacuum clean fan wheel and cabinet.

### 3.7 COMMISSIONING

- A. Final Checks before Startup: Perform the following operations and checks before startup:
  - 1. Verify that shipping, blocking, and bracing are removed.
  - 2. Verify that unit is secure on mountings and supporting devices and that connections for piping, ducts, and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnects.
  - 3. Perform cleaning and adjusting specified in this Section.
  - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
  - 5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
  - 6. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in the fully open position.
  - 7. Disable automatic temperature-control operators.
- B. Starting procedures for fans are as follows:
  - 1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
  - 2. Measure and record motor voltage and amperage.
- C. Shut unit down and reconnect automatic temperature-control operators.
- D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for air-handling-system testing, adjusting, and balancing.
- E. Replace fan and motor pulleys as required to achieve design conditions.

### 3.8 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, and preventive maintenance.
- B. Review data in the operation and maintenance manuals. Refer to Division 1 Section "Contract Closeout."
- C. Schedule training with Owner, through Architect, with at least 7 days' advance notice.
- D. Demonstrate operation of power ventilators. Conduct walking tour of the Project. Briefly identify location and describe function, operation, and maintenance of each power ventilator.

**END OF SECTION 15838**

**SECTION 15855 - DIFFUSERS, REGISTERS, AND GRILLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUBMITTALS**

- A. Product Data: For each product indicated, include the following:
  - 1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
  - 2. Diffuser, Register, and Grille Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Samples for Verification: For diffusers, registers, and grilles, in manufacturer's standard sizes to verify color selected.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

**2.2 GRILLES AND REGISTERS**

- 1. Manufacturers:
  - a. Nailor Industries of Texas Inc.
  - b. Titus.
  - c. Tuttle & Bailey.

### 2.3 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install diffusers, registers, and grilles level and plumb.
- B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

### 3.3 ADJUSTING

- A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 15855



**SECTION 15950 - TESTING, ADJUSTING, AND BALANCING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes TAB to produce design objectives for the following:
  - 1. Air Systems:
    - a. Constant-volume air systems.

**1.3 SUBMITTALS**

- A. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- B. Warranties specified in this Section.

**1.4 QUALITY ASSURANCE**

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.
- B. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
  - 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
  - 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.

**1.5 COORDINATION**

- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.
- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

**1.6 WARRANTY**

- A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:

**PART 2 - PRODUCTS (Not Applicable)****PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
  - 1. Contract Documents are defined in the The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and the Supplemental Specifications, latest editions, of Contract.
  - 2. Verify that balancing devices, such as test ports and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. Examine automatic temperature system components to verify the following:
  - 1. Dampers and other controlled devices are operated by the intended controller.

2. Dampers are in the position indicated by the controller.
  3. Integrity of dampers for free and full operation and for tightness of fully closed and fully open positions.
  4. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
  5. Sensors are located to sense only the intended conditions.
  6. Sequence of operation for control modes is according to the Contract Documents.
  7. Controller set points are set at indicated values.
- D. Interlocked systems are operating.
- E. Examine equipment performance data including fan curves. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- F. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- G. Examine system and equipment test reports.
- H. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, , thermometer wells and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- I. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- J. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- K. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- L. Examine equipment for installation and for properly operating safety interlocks and controls.
- M. Examine temperature system components to verify that equipment is functioning properly.
- N. Report deficiencies discovered before and during performance of TAB procedures.

**3.2 GENERAL PROCEDURES FOR TESTING AND BALANCING**

- A. Perform testing and balancing procedures on each system according to the procedures contained in the forms.
- B. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- C. Take and report testing and balancing measurements in inch-pound (IP) units.

**3.3 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS**

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Check airflow patterns from the outside-air louvers and dampers and the return- and exhaust-air dampers, through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling unit components.
- K. Check for proper sealing of air duct system.

**3.4 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS**

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - a. Measure fan static pressures to determine actual static pressure.

- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within industry tolerances.

### 3.5 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

### 3.6 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Refrigerant Coils: Measure the following data for each coil:
  1. Dry-bulb temperature of entering and leaving air.
  2. Wet-bulb temperature of entering and leaving air.
  3. Airflow.
  4. Air pressure drop.
  5. Refrigerant suction pressure and temperature.

### 3.7 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

**END OF SECTION 15950**

**SECTION 16010 - BASIC ELECTRICAL REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes general administrative and procedural requirements for electrical installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in Division 1:
  - 1. Submittals.
  - 2. Coordination drawings.
  - 3. Site Inspection.
  - 4. Permits, Inspections, Codes and Fees.
  - 5. Public Utilities.
  - 6. Load Balancing and Testing.
  - 7. Record documents.
  - 8. Maintenance manuals.
  - 9. Rough-ins.
  - 10. Electrical installations.
  - 11. Cutting and patching.
  - 12. Final Inspection.
  - 13. Guarantee.
- B. Related Sections: The following sections contain requirements that relate to this section:
  - 1. Division 16 Section "BASIC ELECTRICAL MATERIALS AND METHODS," for materials and methods common to the remainder of Division 16, plus general related specifications including:
    - a. Access to electrical installations.
    - b. Excavation for electrical installations within the building boundaries and from building to utility connections.

### 1.3 SUBMITTALS

- A. General: Follow the procedures specified in Division 1 Section "SUBMITTALS."
- B. Additional copies may be required by individual sections of these Specifications.
- C. General requirements for each submittal shall include, but shall not be limited to the following:
  - 1. Index Sheet.
  - 2. General Contractors Name and Review Stamp.
  - 3. Electrical Sub-Contractors Name and Review Stamp.
  - 4. Project Name.
  - 5. Function of the Equipment to be Furnished.
  - 6. Equipment Identification, from Contract Documents.
  - 7. Picture of the Equipment.
  - 8. Ratings, Dimensions and Service Clearances.
  - 9. Arrangement to be Furnished.
  - 10. Electrical Characteristics.
  - 11. Data Sheets of Accessories to be Furnished.
  - 12. Light Fixture Identification, from Contract Documents.
  - 13. Applicable specification section number.
    - a. Submittals that do not bear the Electrical Subcontractor's name and review stamp will be returned without being reviewed.
    - b. Selected sections of this specification do not require any submittals. Submit only the requested data identified under the "Submittals" portion of those sections requiring submittals. Unrequested submittals will not be processed or reviewed.
    - c. When product data sheets depict multiple different items, the specific item being submitted shall be clearly identified.

### 1.4 COORDINATION DRAWINGS

- A. Prepare coordination drawings in accordance with Division 1 Section "PROJECT COORDINATION," to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
  - 1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:

- a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
  - b. Exterior wall and foundation penetrations.
  - c. Fire-rated wall and floor penetrations.
  - d. Equipment connections and support details.
  - e. Sizes and location of required concrete pads and bases.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
  3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.

### 1.5 SITE INSPECTION

- A. Before submitting proposal, examine all existing conditions affecting compliance with Division 16 and drawings by visiting site and/or building. Ascertain access to site, available storage space and delivery facilities.
- B. Location and elevation of existing underground utilities, such as sewers, water piping, conduit, etc. are as exact as can be determined from available information and their accuracy cannot be guaranteed. Exact location and elevation of these existing services shall be verified by Contractor prior to excavation or installation of work. Exercise special care when excavating at or near general location of existing underground utilities to avoid damage to utility services, as well as to assure safety.
- C. Connections to or relocation of existing utility lines requiring temporary discontinuation of utility services which are in active use shall be scheduled and coordinated with Utility companies and representatives of Owner. Premium time required for installation of connections and relocations shall be included in bid. Services shall not be left disconnected at end of working day or weekend unless authorized by representatives of Utilities and Owner. Existing utility services damaged due to operation of Contractor shall be repaired to satisfaction of Owner and Utility Company at Contractor's expense.

### 1.6 PERMITS, INSPECTIONS, CODES AND FEES

- A. Comply with all the latest Federal, State, City and Utility Company, rules, regulations, and ordinances having jurisdiction over this work. These codes shall supersede the specifications and drawings. Applicable codes shall include, but shall not be limited to the following:
  1. Americans with Disabilities Act Accessibility Guidelines.
  2. Uniform Federal Accessibility Standards



3. BOCA Code, 1999 Edition
  4. National Electrical Code, 2002 Edition
  5. All applicable NFPA Codes.
  6. All applicable electric utility, telephone company and cable television company rules, regulations and standards.
  7. All local codes, rules, regulations and ordinances enforced by the Authority Having Jurisdiction.
- B. All work shall be in accordance with the latest editions of the National Electric Code and the Electric Codes in the locale in which the work is being performed.
- C. All equipment furnished for this project shall be listed and labeled by a nationally recognized testing laboratory.
- D. The complete electrical installation shall be inspected by the authority having jurisdiction in the locale. The agency shall certify that the installation is in accordance with the latest editions of the National Electrical Code or such other standards as may be applicable. Bear all costs of such inspections and certifications.
- E. Apply for, obtain and pay any and all fees or service charges related to required permits and/or inspections.
- F. Contact electric, telephone and cable television utility companies prior to bid and ascertain all fees and charges associated with the Work of Division 16. Include all fees and charges in Bid Proposal.
- G. Furnish to Owner certificates of inspection or approval from authorities having jurisdiction, if certificates of inspection or approval are required by law or regulations, upon completion of work.

## 1.7 PUBLIC UTILITIES

- A. Work of this contract associated with the work of the local electric, telephone and cable telephone utility companies shall be installed in strict accordance with the standards of each utility company.
- B. Coordinate the electrical work with the requirements of the local electric, telephone and cable television utility companies.
1. Meet jointly with representatives of the electric, telephone and cable television utility companies to exchange information and agree on details of installation interfaces. For each meeting held, prepare a Meeting Record to document items discussed, agreements reached, etc. Submit a copy of the Meeting Record to the Engineer.

## 1.8 LOAD BALANCING AND TESTING

- A. Perform tests by energizing all lighting, motors, and other electrical equipment simultaneously.
- B. Alter fuses, circuit breakers, circuit connections, etc. as required for satisfactory performance. Take voltage and amperage readings at all panels. Change lamps found to be of improper voltage rating. Check the amperage draw, voltage and direction of rotation of each motor. Make all necessary changes to obtain proper rotation, motor terminal voltage, motor protection, etc. Revise heater elements as required for proper motor protection. Similarly check all other electrically connected equipment.

## 1.9 RECORD DOCUMENTS

- A. Prepare record documents in accordance with the requirements in Division 1 Section "PROJECT CLOSEOUT", and the requirements listed herein.
- B. Obtain a full-size set of blueline prints of contract drawings pertaining to this work immediately upon commencing work. This set of drawings shall be kept on project site at all times and shall be used for recording the following information on a day-to-day basis:
  - 1. Diagrammatic representation of all raceways, conductors, cables, etc. routed between all devices (light fixtures, wiring devices, fire alarm system devices).
  - 2. Quantity of conductors within each branch circuit raceway (indicate by "hatch-marks" on raceway).
  - 3. Homerun arrows to panelboards, complete with circuit numbers and quantity of conductors within raceway (indicate by "hatch marks" on raceway).
  - 4. At each item of equipment, light fixture, wiring device, etc. indicate the actual circuit number supplying the respective item.
  - 5. The locations of all pullboxes 8" square and larger, and the circuit numbers of the circuits contained within the pullbox.
  - 6. The location of the service entrance ductbank installed underground. Locate by dimension, from permanent building structure.
- C. Contractor shall obtain from Architect/Engineer a set of reproducible paper sepia tracings of original Contract Documents at end of project. Contractor shall bear the cost of paper sepias. Contractor shall eradicate original contract information as may be required, and replace with record condition information as was recorded on blueline prints at jobsite during time of installation. When completed the paper sepias shall contain all of the record information recorded on the blueline prints at the jobsite.

- D. After the transferring of record information onto the sepia drawings has been completed, the sepia drawings shall be submitted to the Architect/Engineer for approval prior to the authorization for final payment to Contractor. Record drawings (sepias) shall be certified as to their correctness by the signature of Contractor and shall be stamped or otherwise permanently identified as "Record Drawings".

#### **1.10 MAINTENANCE MANUALS**

- A. Prepare maintenance manuals in accordance with Division 1 Section "PROJECT CLOSEOUT." In addition to the requirements specified in Division 1, include the following information for equipment items:
  1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
  2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
  3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
  4. Names, addresses, telephone numbers, etc. of local suppliers, factory representatives or service agencies for all major items of equipment and systems.
  5. Servicing instructions and lubrication charts and schedules.

#### **1.11 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

#### **1.12 SEISMIC REQUIREMENTS**

- A. Provide seismic restraints for electrical work in conformance with 2002 International Building Code.

**1.13 DEFINITIONS**

- A. The term "Unfinished Space": As used on any electrical drawing or in any Division 16 specification section, shall include, but shall not necessarily be limited to a space such as a mechanical or electrical equipment room, janitors closet, etc. "Unfinished Spaces" are generally unpainted and are accessible only to authorized building personnel.
- B. The term "Finished Space": As used on any electrical drawing and in any Division 16 specification section, shall be any space that is not defined in this specification as an "unfinished space" (i.e. occupied rooms, corridors, storage rooms, etc.).
- C. The term "Exterior" or "Outdoors": As used on any electrical drawing or in any Division 16 specification section shall be defined as exposed to atmospheric weather conditions.
- D. The term "Interior" or "Indoors": As used on any electrical drawing or in any Division 16 specification section, shall be defined as not exposed to atmospheric weather conditions.

**PART 2 - PRODUCTS (Not Applicable)****PART 3 - EXECUTION****3.1 ROUGH-IN**

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

**3.2 ELECTRICAL INSTALLATIONS**

- A. General: Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements and the requirements of Section 16050:
  - 1. Verify all dimensions by field measurements.
  - 2. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in

diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Architect.

### 3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with Division 1 Section "CUTTING AND PATCHING." In addition to the requirements specified in Division 1, the following requirements apply:
1. Perform cutting, fitting, and patching of electrical equipment and materials required to:
  2. Uncover Work to provide for installation of ill-timed Work.
    - a. Remove and replace defective Work.
    - b. Remove and replace Work not conforming to requirements of the Contract Documents.
    - c. Install equipment and materials in existing structures.
    - d. Upon written instructions from the Architect, uncover and restore Work to provide for Architect observation of concealed Work.
  3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
  4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
  5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
  6. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
    - a. Refer to Division 1 Section "DEFINITIONS AND STANDARDS" for definition of experienced "Installer."

### 3.4 FINAL INSPECTION

- A. Contractor shall review requirements of Contract Document's inspect work and inform parties involved of work to be corrected or completed before project can be deemed substantially complete.
- B. Notify Architect/Engineer in writing, when project is substantially complete listing those items of work remaining incomplete and anticipated date that remaining work will be completed. Final inspection of project will then be scheduled by Architect/Engineer. Architect/Engineer reserves right to cancel

and reschedule inspection in event considerable more work remains to be completed or corrected than indicated in written request for inspection.

- C. Items not completed or found not complying with drawings or specifications by Architect/Engineer will be identified in inspection report by Architect/Engineer.
- D. Copy of final inspection report will be given to Contractor and deficient items on inspection report shall be corrected. Contractors shall initial and date items on report after corrections have been completed.
- E. Architect/Engineer will make final check after items have been corrected

### **3.5 GUARANTEE**

- A. Furnish a written guarantee commencing on the date of final acceptance, that any and all defects in material, operation and workmanship appearing within one (1) year shall be repaired or replaced without cost to the Owner. Include all other work which may be damaged during correction of defects. Guarantee shall be signed by a properly authorized officer of the firm.

**END OF SECTION 16010**

**SECTION 16050 - BASIC ELECTRICAL MATERIALS AND METHODS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following electrical materials and methods:
  - 1. Supporting devices for electrical components.
  - 2. Concrete equipment bases.
  - 3. Excavation
  - 4. Electrical demolition.
  - 5. Cutting and patching for electrical construction.
  - 6. Touchup painting.

**1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.

**1.4 QUALITY ASSURANCE**

- A. Comply with NFPA 70 for components and installation.
- B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
  - 1. The Terms "Listed and Labeled": As defined in the National Electrical Code, Article 100.

## 1.5 SEQUENCING AND SCHEDULING

- A. Coordinate electrical equipment installation with other building components.
- B. Arrange for chases, slots, and openings in building structure during progress of construction to allow for electrical installations.
- C. Coordinate installing required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- D. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning prior to closing in the building.
- E. Coordinate connecting electrical and telephone service to components furnished under other Sections.
- F. Coordinate connecting electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies.
- G. Coordinate requirements for access panels and doors where electrical items requiring access are concealed by finished surfaces. Access panels and doors are specified in Section 08305, "Access Doors".

## PART 2 - PRODUCTS

### 2.1 SUPPORTING DEVICES

- A. Channel and angle support systems, hangers, anchors, sleeves, brackets, fabricated items, and fasteners are designed to provide secure support from the building structure for electrical components.
  - 1. Material: Steel, except as otherwise indicated, protected from corrosion with zinc coating or with treatment of equivalent corrosion resistance using approved alternative finish or inherent material characteristics.
  - 2. Metal Items for Use Outdoors or in Damp Locations: Hot-dip galvanized steel, except as otherwise indicated.
- B. Steel channel supports have 9/16-inch diameter holes at a maximum of 8 inches o.c., in at least 1 surface.
  - 1. Fittings and accessories mate and match with channels and are from the same manufacturer.



- A. Raceway Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps or "click"- type hangers.
- F. Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Expansion Anchors: Carbon-steel wedge or sleeve type.
- H. Toggle Bolts: All-steel springhead type.
- I. Powder-Driven Threaded Studs: Heat-treated steel.

## 2.2 CONCRETE EQUIPMENT BASES

- A. Forms and Reinforcing Materials: As specified in Division 3 Section "Cast-in-Place Concrete."
- B. Concrete: 3000-psi, 28-day compressive strength as specified in Division 3 Section "Cast-in-Place Concrete."

## 2.3 EXCAVATION

- A. Provide all excavation, trenching, backfilling, etc. as required for the installation of electrical work. Perform excavating, trenching and backfilling work in accordance with the requirements of Division 2.
- B. Conditions Affecting Excavations: The following project conditions apply:
  - 1. Maintain and protect existing building services which transit the area affected by excavation operations.
  - 2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by excavation operations.
  - 3. Site Information: Subsurface conditions were investigated during the design of the Project. Reports of these investigations are available for information only; data in the reports are not intended as representations or warranties of accuracy or continuity of conditions. The Owner will not be responsible for interpretations or conclusions drawn from this information.
  - 4. Existing Utilities: Locate existing underground utilities in excavation areas prior to commencing excavation work. If utilities are indicated to remain, support and protect existing services during excavation operations.
  - 5. Uncharted or Incorrectly Charted Utilities: Contact utility owner immediately for instructions.

6. Provide temporary utility services to affected areas. Provide minimum of 48-hour notice to General Contractor and Owner prior to utility interruption.
7. Subsidence: Where subsidence occurs at electrical installation excavations during the period 12 months after Substantial Completion, remove surface treatment (i.e., pavement, lawn, or other finish), add backfill material, compact to specified conditions, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent areas.
8. Restoration: Upon completion of installation of work, existing areas disturbed by excavation operations shall be restored to match the appearance, quality and condition of adjacent areas and surfaces. Restoration of a disturbed area shall include, but shall not be limited to, backfilling, compacting, finish grading, seeding, paving, etc. as required for complete restoration. Comply with the requirements of Division 2 when performing restoration work.

#### **2.4 METER SOCKETS**

- A. Provide electric meter sockets comply with serving utility company requirements.

#### **2.5 TOUCHUP PAINT**

- A. For Equipment: Provided by equipment manufacturer and selected to match equipment finish.
- B. For Nonequipment Surfaces: Matching type and color of undamaged, existing adjacent finish.
- C. For Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 EQUIPMENT INSTALLATION REQUIREMENTS**

- A. Install components and equipment to provide the maximum possible headroom where mounting heights or other location criteria are not indicated.
- B. Install items level, plumb, and parallel and perpendicular to other building systems and components, except where otherwise indicated.

- C. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Give right of way to raceways and piping systems installed at a required slope.

### 3.2 ELECTRICAL SUPPORTING METHODS

- A. Damp Locations and Outdoors: Hot-dip galvanized materials, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Conform to manufacturer's recommendations for selecting supports.
- E. Strength of Supports: Adequate to carry all present and future loads, times a safety factor of at least 4; 200-lb-minimum design load.

### 3.3 INSTALLATION

- A. Install devices to securely and permanently fasten and support electrical components.
- B. Raceway Supports: Comply with 2002 International Building Code Seismic requirements and NFPA 70.
- C. Conform to manufacturer's recommendations for selecting and installing supports.
- D. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
- E. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- F. Spare Capacity: Size supports for multiple conduits so capacity can be increased by a 25 percent minimum in the future.
- G. Support individual horizontal raceways with separate, malleable iron pipe hangers or clamps.
- H. Hanger Rods: 1/4-inch diameter or larger threaded steel, except as otherwise indicated.

- I. Spring Steel Fasteners: Specifically designed for supporting single conduits or tubing. May be used in lieu of malleable iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to channel and slotted angle supports.
- J. In open overhead spaces, cast boxes threaded to raceways need not be separately supported, except where used for fixture support; support boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- K. Sleeves: Install for cable and raceway penetrations of concrete slabs and walls. Install for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated assemblies. Install sleeves during erection of concrete and masonry walls.
- L. Firestopping: Apply to cable and raceway penetrations of fire-rated floor and wall assemblies. Perform firestopping as specified in Division 7 Section "Firestopping" to reestablish the original fire-resistance rating of the assembly at the penetration.
- M. Fastening: Unless otherwise indicated, securely fasten electrical items and their supporting hardware to the building structure. Perform fastening according to the following:
  - 1. Fasten by means of wood screws or screw-type nails on wood; toggle bolts on hollow masonry units; concrete inserts or expansion bolts on concrete or solid masonry; and by machine screws, welded threaded studs, or spring-tension clamps on steel.
  - 2. Threaded studs driven by a powder charge and provided with lock washers and nuts may be used instead of expansion bolts, machine screws, or wood screws.
  - 3. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or any other items.
  - 4. In partitions of light steel construction use sheet-metal screws.
  - 5. Fill and seal holes drilled in concrete and not used.
  - 6. Select fasteners so the load applied to any fastener does not exceed 25 percent of the proof-test load.
- N. Install concrete pads and bases according to requirements of Division 3 Section "Cast-in-Place Concrete."
- O. Install utility-metering equipment according to utility company's written requirements. Provide grounding and empty conduits as required by company.

### 3.4 DEMOLITION

- A. Conditions Affecting Selective Demolition: The following project conditions apply:
  - 1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
  - 2. Locate, identify, and protect electrical services passing through demolition areas and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
- B. Where electrical work to remain is damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

### 3.5 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for electrical installations. Perform cutting by skilled mechanics of the trades involved.
- B. Repair disturbed surfaces to match adjacent undisturbed surfaces.

### 3.6 TOUCHUP PAINTING

- A. Thoroughly clean damaged areas and provide primer, intermediate, and finish coats to suit the degree of damage at each location.
- B. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.

**END OF SECTION 16050**

**SECTION 16060 - TEMPORARY ELECTRIC SERVICE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this and other sections of Division 16.

**1.2 SUMMARY**

- A. This Section contains criteria and information pertaining to the installation, maintenance, etc. of a temporary lighting and power system for construction purposes.

**1.3 GENERAL REQUIREMENTS**

- A. Contractor shall include in bid the cost of providing, maintaining and removing temporary lighting and power system. Contractor shall provide all normal maintenance of system for the life of the system. Maintenance shall include, but shall not be limited to, replacement of fuses, lamps, etc., for the life of the system.
- B. The cost of electrical energy consumed by the system shall be borne by the individual, Company or Agency directed under Conditions of the Contract and Division 1 of these Specifications.
- C. Services of higher capacity than those herein specified, if required shall be negotiated. The Contractor requesting special high capacity service shall bear cost of installation, maintenance, energy charges and removal of same.
- D. All wiring and equipment associated with this system shall be installed so as to in no way interfere with the movement or operation of construction equipment or vehicles. Location of all equipment shall be where directed by the General Contractor. Coordinate installation with the work of other trades.

**1.4 QUALITY ASSURANCE**

- A. The entire temporary wiring system (service and distribution) shall comply with the requirements of OSHA, all applicable National Electrical Code Articles, the local utility company and the local authority having jurisdiction.

**1.5 SEQUENCING AND SCHEDULING**

- A. The temporary lighting and power system shall be installed when directed by the General Contractor.
- B. The temporary lighting and power system shall be removed when the permanent lighting and power system has been placed in operation. Verify and coordinate removal time with General Contractor.

**1.6 PRODUCTS**

- A. Panelboards shall be minimum 100 amp capacity, branch circuit type, main lug only. Disconnecting means for panel shall be a heavy duty, fusible disconnect switch. Circuit breakers within panelboard shall be 20 amp, bolt-in, GFCI type. Quantity of circuit breakers to be determined by Contractor at time of installation.
- B. Receptacles shall be 20 amp, 125 volt, duplex, grounding type, NEMA 5-20R. All receptacles shall be installed within outlet boxes.
- C. Conductors for system branch circuit wiring shall be 3 conductor, #10 AWG, non-metallic sheathed cable (Romex), 600 Volt rated. Phase and neutral conductor shall have type TW, THW or THHN/THWN insulation. Ground conductor shall be bare. All conductors shall be copper.
- D. Lighting outlets shall be either incandescent, fluorescent or metal halide (HID). Incandescent outlets shall accommodate a 100-watt minimum to 300-watt maximum incandescent lamp. Fluorescent outlets shall accommodate two (2) 40-watt lamps. Each lighting outlet (incandescent or fluorescent) shall be equipped with wire guards. HID lamps shall be 250 Watt maximum. HID lamps shall be in an enclosed fixture with lens.
- E. Disconnect switch shall be minimum 100 amp heavy duty, fusible type of voltage rating required by installation. Provide switch of NEMA rating (1 or 3R) as required by installation. Switch shall have provisions for padlocking.
- F. Fuses shall be dual element, time delay, current limiting type.
- G. Transformers shall be ventilated dry type, delta primary, grounded wye secondary, equipped with weathershields where required.

**PART 2 - EXECUTION****2.1 INSTALLATION**

- A. Install and maintain the system in all respects. Install panelboard, kilowatt hour meter, disconnect switch, transformer, etc. in space designated by the General Contractor. Coordinate with the work of other trades.
- B. Branch circuits for lighting and power shall be terminated on separate circuit breakers with dedicated neutral conductor.
- C. Temporary lighting circuits shall be installed and distributed such that a lighting outlet shall be provided for every 500 square feet of building area, at stairways between floors, and every 30 feet in corridors.
- D. Temporary power circuits shall be installed and distributed such that no part of the building or structure is more than 30 feet from a 120-volt duplex outlet.
- E. Extension cords for power and additional lighting, if required, shall be the responsibility of the individual subcontractors involved.

**END OF SECTION 16060**



**SECTION 16120 - CONDUCTORS AND CABLES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

**1.3 SUBMITTALS**

- A. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.

**1.4 QUALITY ASSURANCE**

- A. Listing and Labeling: Provide wires and cables specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NFPA 70.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wires and cables according to NEMA WC 26.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Wires and Cables:
    - a. American Insulated Wire Corp.; Leviton Manufacturing Co.
    - b. Carol Cable Co., Inc.
    - c. Senator Wire & Cable Company.
    - d. Southwire Company.
  2. Connectors for Wires and Cables:
    - a. AMP Incorporated.
    - b. General Signal; O-Z/Gedney Unit.
    - c. Monogram Co.; AFC.
    - d. Square D Co.; Anderson.
    - e. 3M Company; Electrical Products Division.

**2.2 BUILDING WIRES AND CABLES**

- A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3 "Wire and Insulation Applications" Article.
- B. Thermoplastic Insulation Material: Comply with NEMA WC 5.
- C. Conductor Material: Copper. Aluminum conductors are not acceptable.
- D. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.
- E. Minimum Conductor Size: #12 AWG.

**2.3 CONNECTORS AND SPLICES**

- A. UL-listed, factory-fabricated wiring connectors of size, ampacity rating, material, type, and class for application and service indicated. Comply with Project's installation requirements and as specified in Part 3 "Wire and Insulation Applications" Article.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine raceways and building finishes to receive wires and cables for compliance with requirements for installation tolerances and other conditions affecting performance of wires and cables. Do not proceed with installation until unsatisfactory conditions have been corrected.

**3.2 WIRE AND INSULATION APPLICATIONS**

- A. Secondary Service Entrance: Type THHN/THWN, in conduit.
- B. Feeders: Type THHN/THWN, in conduit.
- C. Branch Circuits: Type THHN/THWN, in conduit.
- D. Class 1 Control Circuits: Type THHN/THWN, in conduit.
- E. Class 2 Control Circuits: Type THHN/THWN, in conduit.
- F. Flexible connections to light fixtures (fixture whips): Type MC cable, 90 C conductor insulation, interlocked galvanized steel armor, equipment grounding conductor, #12 AWG minimum. All conductors within the cable assembly shall be copper.

**3.3 INSTALLATION**

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."
- B. Pull Conductors: Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.
- D. Install exposed cables for various systems (temperature control, fire alarm) parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible. Secure exposed cables to buildings structural members. Conduit, piping, ductwork, etc. shall not be used to support exposed cables. Exposed cables shall not be installed directly on top

of lay-in ceiling systems, such that the cable interferes with the "lift-out" feature of the ceiling system.

- E. Support cables according to Division 16 Section "Basic Electrical Materials and Methods."
- F. Seal around cables penetrating fire-rated elements according to Division 7 Section "Firestopping."
- G. Identify wires and cables according to Division 16 Section "Electrical Identification."
- H. MC cable shall be used for fixture whips only.

### 3.4 CONNECTIONS

- A. Conductor Splices: Keep to minimum.
- B. Install splices and tapes that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.
- C. Use splice and tap connectors compatible with conductor material.
- D. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.
- E. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- F. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.5 FIELD QUALITY CONTROL

- A. Testing: On installation of wires and cables and before electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.3.1. Certify compliance with test parameters.

- B. Correct malfunctioning conductors and cables at Project site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

**END OF SECTION 16120**

**SECTION 16130 - RACEWAYS AND BOXES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
  - 1. Raceways include the following:
    - a. IMC.
    - b. EMT.
    - c. FMC.
    - d. LFMC.
    - e. RNC.
    - f. Wireways.
  - 2. Boxes, enclosures, and cabinets include the following:
    - a. Device boxes.
    - b. Outlet boxes.
    - c. Pull and junction boxes.
- B. Related Sections include the following:
  - 1. Division 7 Section "Firestopping."
  - 2. Division 16 Section "Basic Electrical Materials and Methods" for raceways and box supports.

**1.3 DEFINITIONS**

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metal conduit.

- C. IMC: Intermediate metal conduit.
- D. LFMC: Liquidtight flexible metal conduit.
- E. RNC: Rigid nonmetallic conduit.

#### 1.4 SUBMITTALS

- A. Product Data: For raceways, fittings and boxes.

#### 1.5 QUALITY ASSURANCE

- A. Listing and Labeling: Provide raceways and boxes specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NECA's "Standard of Installation."
- C. Comply with NFPA 70.

#### 1.6 COORDINATION

- A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Metal Conduit and Tubing:
    - a. Carol Cable Co., Inc.
    - b. Electri-Flex Co.
    - c. Grinnell Co.; Allied Tube and Conduit Div.
    - d. Monogram Co.; AFC.
    - e. Triangle PWC, Inc.
    - f. Wheatland Tube Co.

- g. Picoma
2. Nonmetallic Conduit and Tubing:
    - a. Cantex, Inc.
    - b. Electri-Flex Co.
    - c. Hubbell, Inc.; Raco, Inc.
    - d. Lamson & Sessions; Carlon Electrical Products.
    - e. Southwire/Alflex
    - f. Thomas & Betts Corp.
  3. Conduit Bodies and Fittings:
    - a. American Electric; Construction Materials Group.
    - b. Crouse-Hinds; Div. of Cooper Industries.
    - c. Emerson Electric Co.; Appleton Electric Co.
    - d. Hubbell, Inc.; Killark Electric Manufacturing Co.
    - e. Lamson & Sessions; Carlon Electrical Products.
    - f. O-Z/Gedney; Unit of General Signal.
    - g. Scott Fetzer Co.; Adalet-PLM.
    - h. Spring City Electrical Manufacturing Co.
  4. Metal Wireways:
    - a. B-Line
    - b. Hoffman Engineering Co.
    - c. Square D Co.
    - d. Weigman/Hubbell
  5. Boxes, Enclosures, and Cabinets:
    - a. American Electric; FL Industries.
    - b. Butler Manufacturing Co.; Walker Division.
    - c. Crouse-Hinds; Div. of Cooper Industries.
    - d. Erickson Electrical Equipment Co.
    - e. Hoffman Engineering Co.; Federal-Hoffman, Inc.
    - f. Hubbell Inc.; Killark Electric Manufacturing Co.
    - g. Hubbell Inc.; Raco, Inc.
    - h. Lamson & Sessions; Carlon Electrical Products.
    - i. O-Z/Gedney; Unit of General Signal.
    - j. Robroy Industries, Inc.; Electrical Division.
    - k. Scott Fetzer Co.; Adalet-PLM.
    - l. Spring City Electrical Manufacturing Co.
    - m. Thomas & Betts Corp.
    - n. Woodhead Industries, Inc.; Daniel Woodhead Co.
    - o. B-Line.



**2.2 METAL CONDUIT AND TUBING**

- A. Minimum size for metal conduit and tubing shall be 3/4" except for conduits containing switchlegs shall be 1/2".
- B. IMC: ANSI C80.6.
- C. EMT and Fittings: ANSI C80.3.
  - 1. Fittings: Compression type.
- D. FMC: Zinc-coated steel.
- E. LFMC: Flexible steel conduit with PVC jacket.
- F. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

**2.3 NONMETALLIC CONDUIT AND TUBING**

- A. Minimum size for non-metallic conduit and tubing shall be 3/4".
- B. RNC: NEMA TC 2, Schedule 40 PVC.
- C. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

**2.4 METAL WIREWAYS**

- A. Material: Sheet metal.
- B. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- C. Select features, unless otherwise indicated, as required to complete wiring system and to comply with NFPA 70.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

**2.5 OUTLET AND DEVICE BOXES**

- A. General: Conform to UL 514A, "Metallic Outlet Boxes, Electrical", and UL 514B, "Fittings for Conduit and Outlet Boxes". Boxes shall be to type, shape, size, and depth to suit each location and application.

- B. Steel Boxes: Conform to NEMA OS 1, "Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports." Boxes shall be sheet steel with stamped knockouts, threaded screw holes and accessories suitable for each location including mounting brackets and straps, cable clamps, exterior rings and fixtures studs.
- C. Junction and Device Boxes shall be:
  - 1. 4" square by 1-1/2" depth minimum, without clamps for either conduit or tubing.
  - 2. Of shapes, cubic inch capacities, and sizes, including box depths suitable for installation at respective locations. Construct boxes with mounting holes, and with cable and conduit-size knockout openings in bottom and sides. Provide boxes with threaded screw holes, with corrosion-resistant cover and grounding screws for fastening surface and device type box covers, and for equipment type grounding.
- D. Switch Boxes shall be:
  - 1. Single gang - 2" wide by 4" long by 1-1/2" depth minimum.
  - 2. Two gang - 4" square by 2-1/8" deep.
  - 3. Multi-gang 4-1/2" high by 2-1/8" deep by width as required by number of gangs. Complete with partitions where required.
  - 4. As required for each installation, including mounting brackets, device box extensions, switch box supports, plaster ears, and plaster board expandable grip fasteners, which are compatible with device boxes being utilized to fulfill installation requirements for individual wiring situations. Choice of accessories is installer's code-compliance option.
- E. Boxes for Exposed Work: Ultra-violet stabilized, nonconductive, high impact-resistant boxes with integrally molded raceway entrance hubs and removable mounting flanges. Boxes shall be equipped with threaded screw holes for device and cover plate mounting. Each box shall have a molded cover of matching PVC material suitable for the application.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces to receive raceways and boxes for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 WIRING METHODS

- A. Outdoors: Use the following wiring methods:
  - 1. Exposed: IMC.
  - 2. Concealed: IMC.
  - 3. Underground, Single Run: RNC.
  - 4. Underground, Grouped: RNC.
  - 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 6. Boxes and Enclosures: NEMA 250, Type 3R.
  
- B. Indoors: Use the following wiring methods:
  - 1. Exposed: EMT.
  - 2. Concealed within walls and above ceilings: EMT.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except in wet or damp locations, use LFMC.
  - 4. Boxes and Enclosures: NEMA 250, Type 1.

### 3.3 MOUNTING HEIGHTS

- A. Install outlet boxes for the following devices at the mounting heights specified herein, unless noted otherwise on the drawings.
  - 1. Receptacles: Bottom of box 18 inches AFF.
  - 2. Receptacles above countertops: Bottom of box 6 inches above countertop. Refer to Architectural drawings for exact height of countertops.
  - 3. Toggle Switches: Top of box 48 inches AFF.
  - 4. Voice/Data: Bottom of box 18 inches AFF.
  - 5. Wall Phone Outlets: Top of box 48 inches AFF.
  - 6. Fire Alarm System Manual Pull Stations: Top of box 48 inches AFF.
  - 7. Fire Alarm System Strobe Lights: Top of box 80 inches AFF.

### 3.4 INSTALLATION

- A. Install raceways and boxes as indicated, according to manufacturer's written instructions.
  
- B. Within finished spaces, conceal conduit and EMT within finished walls and above ceilings. Within unfinished spaces, install conduit exposed overhead and on wall.

- C. Keep raceways at least 6 inches away from parallel runs of flues and hot-water pipes. Install horizontal raceway runs above water and steam piping.
- D. Install raceways level and square and at proper elevations. Provide adequate headroom.
- E. Complete raceway installation before starting conductor installation.
- F. Support raceways as specified in Division 16 Section "Basic Electrical Materials and Methods."
- G. Use temporary closures to prevent foreign matter from entering raceways.
- H. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- I. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- J. Use raceway fittings compatible with raceways and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings, unless otherwise indicated.
- K. Run concealed raceways, with a minimum of bends, in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.
- L. Raceways Below Slabs: Raceways installed below slab-on-grade construction shall be installed within the gravel sub-base.
  - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
  - 2. Space raceways laterally to prevent voids in concrete.
  - 3. Transition from nonmetallic tubing to IMC before rising above floor.
- M. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.
  - 1. Run parallel or banked raceways together, on common supports where practical.
  - 2. Make bends in parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.
- N. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
  2. Use insulating bushings to protect conductors.
- O. Tighten setscrews of threadless fittings with suitable tools.
- P. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.
- Q. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.
- R. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of the pull wire.
- S. Install raceway sealing fittings according to manufacturer's written instructions. Locate fittings at suitable, approved, and accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
1. Where otherwise required by NFPA 70.
- T. Flexible Connections: Use maximum of 6 feet of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquidtight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings and finishes are without damage or deterioration at the time of Substantial Completion.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

**3.6 CLEANING**

- A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

**END OF SECTION 16130**

**SECTION 16140 - WIRING DEVICES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes receptacles, connectors, switches, and finish plates.

**1.3 DEFINITIONS**

- A. GFCI: Ground-fault circuit interrupter.

**1.4 SUBMITTALS**

- A. Product Data: For each product specified.

**1.5 QUALITY ASSURANCE**

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NEMA WD 1.
- C. Comply with NFPA 70.

**1.6 COORDINATION**

- A. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 1. Cord and Plug Sets: Match equipment requirements.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Light Switches - Toggle Handle Type
  - a. 20 amp, 120-277 volt
    - 1) Single Pole
      - a) Cooper – 2221-GY
      - b) Hubbell – HBL-1221GY
      - c) Leviton – 1221-2-GY
      - d) Pass Seymour - PS20AC1-I
    - 2) Three-Way
      - a) Cooper – 2223-GY
      - b) Hubbell – HBL-1223GY
      - c) Leviton – 1223-3-GY
      - d) Pass Seymour - PS20AC3-GY
    - 3) Four-Way
      - a) Cooper – 2223-GY
      - b) Hubbell – HBL-1223GY
      - c) Leviton – 1223-3-GY
      - d) Pass Seymour - PS20AC3-GY
  2. Duplex Receptacles
    - a. 20 amp, 125 volt, grounding type, straight blade, NEMA 5-20R-standard face.
      - 1) Cooper – 5362GY
      - 2) Hubbell – HBL-5362GY
      - 3) Leviton – 5362-AGY
      - 4) Pass Seymour - 5362-AGRY
    - b. Ground fault interrupting, feed-through type, 20 amp, 125 volt, grounding type, straight blade, NEMA 5-20R.
      - 1) Cooper – XGF20G
      - 2) Hubbell - GF5362-GYA



- 3) Leviton – 6899-G
- 4) Pass Seymour - 2094-G

## 2.2 WALL PLATES

- A. Single and combination types match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Wall Plates for Finished Spaces: 0.04-inch- thick, Type 302, satin-finished stainless steel.
  3. Wall Plates for Unfinished Spaces: Galvanized steel.
  4. Wall plates for damp/wet locations:
    - a. Duplex Receptacles: Leviton #4926 or approved equal.
    - b. GFI Receptacles: Leviton #4992 or approved equal.
    - c. Toggle Switches: Leviton #1432 or approved equal.
  5. Wall plates for "GFCI protected" duplex receptacles: 0.25" high, black filled recessed lettering "GFCI protected".
    - a. Stainless steel type: Hubbell #S8GFIV or approved equal.
    - b. Nylon type (ivory color): Hubbell #PJ8GFI or approved equal.

## 2.3 FINISHES

- A. Color: Gray, unless otherwise indicated or required by Code.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install devices and assemblies plumb and secure.
- B. Install wall plates when painting is complete.
- C. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical, and grounding terminal of receptacles on top. When devices are installed with the long dimension horizontal, neutral terminal of receptacle shall be on top. Group adjacent switches under single, multigang wall plates.
- D. Protect devices and assemblies during painting.

**3.2 IDENTIFICATION**

- A. Comply with Division 16 Section "Electrical Identification."

**3.3 CONNECTIONS**

- A. Connect wiring device grounding terminal to branch-circuit equipment grounding conductor.
- B. Tighten electrical connectors and terminals according to manufacturers published torque-tightening values. If manufacturers torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.4 FIELD QUALITY CONTROL**

- A. Test wiring devices for proper polarity and ground continuity.
- B. Test GFCI operation with both local and remote fault simulations according to manufacturer's written instructions.
- C. Replace damaged or defective components.

**3.5 CLEANING**

- A. Internally clean devices, device outlet boxes, and enclosures. Replace stained or improperly painted wall plates or devices.

**END OF SECTION 16140**

**SECTION 16195 - ELECTRICAL IDENTIFICATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes identification of electrical materials, equipment, and installations.

**1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of product specified.

**1.4 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with ANSI C2.

**1.5 SEQUENCING AND SCHEDULING**

- A. Coordinate installing electrical identification after completion of finishing where identification is applied to field-finished surfaces.
- B. Coordinate installing electrical identifying devices and markings prior to installing acoustical ceilings and similar finishes that conceal such items.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Labelmark Co.; Labelmaster Subsidiary.
  2. Brady USA, Inc.; Industrial Products Div.
  3. Calpico, Inc.
  4. Carlton Industries, Inc.
  5. Champion American, Inc.
  6. Cole-Flex Corp.
  7. D&G Sign and Label.
  8. EMED Co., Inc.
  9. George-Ingraham Corp. (The).
  10. Grimco, Inc.
  11. Ideal Industries, Inc.
  12. Kraftbilt.
  13. LEM Products, Inc.
  14. Markal Corp.
  15. National Band & Tag Co.
  16. Panduit Corp.
  17. Radar Engineers.
  18. Ready Made Sign Co.; Cornerstone Direct Corp. Div.
  19. Seton Name Plate Co.
  20. Standard Signs, Inc.

**2.2 RACEWAY AND CABLE LABELS**

- A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
- C. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.
- D. Underground Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
1. Size: Not less than 6 inches wide by 4 mils thick.

2. Compounded for permanent direct-burial service.
  3. Embedded continuous metallic strip or core.
  4. Printed Legend: Indicates type of underground line.
- E. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

### 2.3 ENGRAVED NAMEPLATES AND SIGNS

- A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Engraving stock, melamine plastic laminate, 1/16-inch minimum thick for signs up to 20 sq. in., 1/8 inch thick for larger sizes.
1. Engraved Legend: White letters on black face.
  2. Punched for mechanical fasteners.
- C. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

### 2.4 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties with the following features:
1. Minimum Width: 3/16 inch.
  2. Tensile Strength: 50 lb minimum.
  3. Temperature Range: Minus 40 to 185 deg F.
  4. Color: As indicated where used for color coding.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install identification devices according to manufacturer's written instructions.
- B. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

- C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations used in the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.
- D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.
- E. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.
- F. Identify Raceways and Exposed Cables of Certain Systems with Color Banding: Band exposed and accessible raceways of the systems listed below for identification.
  - 1. Bands: Colored adhesive tape. Make each color band 2 inches wide, completely encircling conduit.
  - 2. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25 feet in congested areas.
  - 3. Colors: As follows:
    - a. Fire-Alarm System: Red.
- G. Install Circuit Identification Labels on Boxes: Label externally as follows:
  - 1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
  - 2. Concealed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.
  - 3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.
- H. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches below finished grade. Where multiple lines installed in a common trench or concrete envelope do not exceed an overall width of 16 inches, use a single line marker.
  - 1. Limit use of line markers to direct-buried cables.
  - 2. Install line marker for underground wiring, both direct buried and in raceway.
- I. Color-Code Conductors: Secondary service, feeder, and branch circuit conductors throughout the secondary electrical system.
  - 1. 208/120-V System: As follows:

- a. Phase A: Black.
  - b. Phase B: Red.
  - c. Phase C: Blue.
  - d. Neutral: White.
  - e. Ground: Green.
2. Factory-apply color the entire length of the conductors, except the following field-applied, color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
    - a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply the last 2 turns of tape with no tension to prevent possible unwinding. Use 1-inch- wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.
- J. Conduit Stub Identification: Conduits that stub-up into the ceiling plenum for the installation of special system wiring (voice, data, video, fire alarm, etc.) shall have the end of the conduit in the ceiling plenum labeled identifying the type of service to be contained within. Label conduit stub with black, felt-tip, permanent marker.
- K. Apply identification to conductors as follows:
1. Conductors to Be Extended in the Future: Indicate source and circuit numbers.
  2. Multiple Power or Lighting Circuits in the Same Enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color coding for voltage and phase indication of secondary circuit.
  3. Multiple Control and Communications Circuits in the Same Enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color coding, or cable marking tape.
- L. Install identification as follows:
1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. Except as otherwise indicated, provide a single line of text with 1/2-inch- high lettering on 1-1/2-inch- high label. Use white lettering on black field. Apply labels for each unit of the following categories of equipment.
    - a. Panelboards, electrical cabinets, and enclosures.
    - b. Access doors and panels for concealed electrical items.
    - c. Main Distribution Panel
    - d. Fire-alarm control panel.

- e. Branch circuit breaker feeder units within distribution panels.
  - f. Individually mounted motor starters, disconnect switches and circuit breakers.
  - g. Relay Panels
2. Apply designation labels of engraved plastic laminate. For panelboards, provide framed, typewritten circuit schedules with explicit description and identification of items controlled by each individual breaker. Utilize room numbers to identify the location of the load being served. Room numbers used in the circuit directories shall be final. Owner-assigned room numbers and not the numbers appearing on the Contract Documents.

**END OF SECTION 16195**



**SECTION 16231 – PACKAGED ENGINE GENERATORS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SCOPE OF WORK**

- A. Base Bid:
  - 1. Electrical Contractor shall provide:
    - a. Battery charger.
    - b. Engine-generator set.
    - c. Outdoor Enclosure.
    - d. Muffler.
    - e. Exhaust piping external to set.
    - f. Remote annunciator.
    - g. Starting battery.

**1.3 RELATED SECTIONS**

- A. Section 16050 – Basic Electrical Materials and Methods.
- B. Section 16452 – Grounding.
- C. Section 16415 – Transfer Switches.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this project shall maintain, within 200 miles of project site, a service center capable of providing training, parts, and emergency maintenance repairs.
  - 1. Engineering Responsibility: Preparation of data for vibration isolators and seismic restraints of engine skid mounts, including shop drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this project. Source limitations: Obtain packaged generator sets and auxiliary components through one

source. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX for welding exhaust system piping.

## 1.5 REGULATORY REQUIREMENTS

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a Nationally Recognized Testing Laboratory, and marked for intended use.
- B. Comply with NFPA 37.
- C. Comply with UL 2200.
- D. Comply with NFPA 70. Comply with NFPA 99. Comply with NFPA 110 requirements for emergency power supply system. Engine Exhaust Emissions: Comply with applicable state and local government requirements.

## 1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor bolt inserts into bases.
- B. Coordinate conduit stub-ups with equipment provided.

## 1.7 SUBMITTALS

- A. Product Data: Include data on features, components, accessories ratings, and performance.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connections.
  - 1. Dimensioned outline plan and elevation drawings of engine-generator set and other components specified.
  - 2. Wiring Diagrams: Power, signal, and control wiring.
  - 3. Submit color chart of enclosure finishes for approval by the architect. Welding certificates. Manufacturer Seismic Qualification Certification: Submit certification that day tank, engine-generator set, batteries, batty racks, accessories, and components will withstand seismic forces. Include the following:
    - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation. The term "withstand" means "the unit will remain in place without

separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event.”

- b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
  - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.  
Qualification Data: For Installer. Certified summary of prototype-unit test report.
- C. Certified Test Reports: For components and accessories that are equivalent, but not identical, to those tested on prototype unit.
- D. Test Reports:
1. Report of factory test on units to be shipped for this project, showing evidence of compliance with specified requirements.
  2. Report of sound generation. Report of exhaust emissions showing compliance with applicable regulations. Field quality control test reports.
- E. Operation and Maintenance Data: For packaged engine generators to include in emergency, operation, and maintenance manuals. Include the following:
1. List of tools and replacement items recommended to be stored at the project for ready access. Include part and drawing numbers, current unit prices, and source of supply.

## 1.8 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months full maintenance by skilled employees of manufacturer’s designated service organization. Include quarterly exercising to check for proper starting, load transfer, and running under load. Include routine preventive maintenance as recommended by manufacturer and adjusting as required for proper operation. Maintenance agreements shall include parts and supplies as used in manufacture and installation of original equipment.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Caterpillar; Engine Div.
2. Generac Power Systems, Inc.
3. Kohler Co; Generator Division.
4. Onan Corp./Cummins Power Generation; Industrial Business Group

## 2.2 ENGINE-GENERATOR SET

- A. Packaged engine-generator set shall be a coordinated assembly of compatible components. Power Output Ratings: Nominal ratings as indicated with capacity as required to operate as a unit as evidenced by records of prototype testing.
- B. Output Connections: 120/208 Volts, three phase, four wire.
- C. Rating: 60kW, Standby.
- D. Safety Standard: Comply with ASME B15.1.
- E. Nameplates: Each major system component shall be equipped with a nameplate to identify manufacturer's name and address, and model and serial number of component.
- F. Fabricate engine-generator-set mounting frame and attachment of components to resist generator-set movement during a seismic event.
- G. Mounting Frame: Adequate strength and rigidity to maintain alignment of mounted components without depending on concrete foundation. Mounting frame shall be free from sharp edges and corners and shall have lifting attachments arranged for lifting with slings without damaging components.
  1. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.

## 2.3 GENERATOR-SET PERFORMANCE

- A. Steady-State Voltage Operational Bandwidth: 4 percent of rated output voltage from no load to full load.
- B. Steady-State Voltage Modulation Frequency: Less than 1 Hz.
- C. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
- D. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.

- E. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
- F. Transient Frequency Performance: Less than 5 percent variation for a 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
- G. Output Waveform: At no load, harmonic content measured line-to-line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. The telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
- H. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, the system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
- I. Start Time: NFPA 110, Type 10, system requirements.

## 2.4 SERVICE CONDITIONS

- A. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
  - 1. Ambient Temperature: Minus 15 to plus 40 deg C.
  - 2. Relative Humidity: 0 to 95 percent.
  - 3. Altitude: Sea level to 1000 feet. Unusual Service Conditions: Engine-generator equipment and installation are required to operate under the following conditions:
    - a. Wind blown sand or dirt.

## 2.5 ENGINE AND FUEL REQUIREMENTS

- A. Fuel Oil, Grade DF-2.
- B. Rated Engine Speed: 1800 rpm.
- C. Maximum Piston Speed for Four-Cycle Engines: 2250 fpm.
- D. Lubrication System: The following items are mounted on engine or skid:
  - 1. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.

2. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
3. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.

E. Engine Fuel System

1. Main Fuel Pump: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
2. Relief-Bypass Valve: Automatically regulates pressures in fuel line and returns excess fuel to source.
3. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity. Heaters shall operate on 120VAC.
4. Governor: Adjustable isochronous, with speed sensing.

## 2.6 ENGINE COOLING SYSTEM

- A. Description: Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump. Rated for specified coolant.
- B. Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
- C. Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
- D. Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
- E. Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
  1. Rating: 50-psig maximum working pressure with coolant at 180 deg F, and non-collapsible under vacuum.
  2. End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections. Coolant piping external to engine-generator set. Use copper tubing with brazed joints, sized as recommended by engine manufacturer. Refer to Division 15 Section "Basic Mechanical Materials and Methods" for basic piping installation and joint construction.

## 2.7 FUEL SUPPLY SYSTEM

- A. Base-Mounted Fuel Oil Tank: Double-wall type, factory fabricated, installed and piped, complying with all applicable NFPA codes and UL 142. Tank shall be sized to allow 48 hours of operation at full load. Features include the following:
1. Tank Level Indicator Capacity: Fuel for 48 hours continuous operation at 100 percent rated power output.
  2. Vandal-resistant fill cap.
  3. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
  4. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.
  5. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.
  6. Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of tank leak.

## 2.8 ENGINE EXHAUST SYSTEM

- A. Muffler: Critical type, sized as recommended by engine manufacturer; sound level measured at a distance of 10 feet from exhaust discharge shall be 85 dBA or less.
- B. Condensate Drain for Muffler: Schedule 40, black steel pipe connected to muffler drain outlet through a petcock.
- C. Connection from Engine to Exhaust System: Flexible section of corrugated stainless steel pipe.
- D. Connection from Exhaust Pipe to Muffler: Stainless steel expansion joint with liner.
- E. Exhaust Piping External to Engine: ASTM A 53/A 53M, Schedule 40, welded, black steel, with welded joints and fittings.

## 2.9 COMBUSTION AIR INTAKE

- A. Description: Heavy duty, engine-mounted air cleaner with replaceable dry filter element and "block filter" indicator.

## 2.10 STARTING SYSTEM

- A. Description: 12 or 24-V electric, with negative ground and including the following:
1. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in "Environmental Conditions" Paragraph in "Service Conditions" article.
  2. Cranking Motor: Heavy duty unit that automatically engages and releases from engine flywheel without binding.
  3. Cranking Cycle: 60 seconds.
  4. Battery: Adequate capacity within ambient temperature range specified in "Environmental Conditions" Paragraph in "Service Conditions" article to provide specified cranking cycle at least three times without recharging.
  5. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
  6. Battery Compartment: Factory fabricated of composite with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in "Environmental Conditions" Paragraph in "Service Conditions" article. Include accessories required to support and fasten batteries in place.
- B. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236 and include the following features:
1. Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
  2. Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
  3. Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
  4. Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates. Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery charger malfunction indication at system control and monitoring panel.
  5. Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.



## 2.11 CONTROL AND MONITORING

- A. Functional Description: When mode-selector switch on the control and monitoring panel is in the automatic position, remote control contacts in one or more separate automatic transfer switches initiate starting and stopping of the generator set. When mode-selector switch is switched to the "ON" position, the generator set starts. The "OFF" position of the same switch initiates generator-set shutdown. Then generator set is "RUNNING", specified system or equipment failure or derangements automatically shut down the generator set and initiate alarms. Operation of a remote emergency-stop switch also shuts down the generator set.
- B. Configuration: Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration. Indicating and protective devices and controls shall include those required by NFPA 110, and the following:
1. Indicating and Protective Devices and Controls: AC voltmeter.
    - a. AC ammeter.
    - b. AC frequency meter.
    - c. DC voltmeter (alternator battery charging).
    - d. Engine-coolant temperature gage.
    - e. Engine lubricating oil pressure gage.
    - f. Running time meter.
    - g. Ammeter-voltmeter, phase-selector switch(es).
    - h. Generator-voltage adjusting rheostat. Start-stop auto switch.
    - i. Over speed shutdown device.
    - j. Coolant high-temperature shutdown device.
    - k. Coolant low-level shutdown device.
    - l. Oil low-pressure shutdown device. Fuel tank derangement alarm.
    - m. Fuel tank high-level shutdown of fuel supply alarm. Generator overload.
- C. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
- D. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmissions to remote data terminals.

## 2.12 GENERAL OVERCURRENT AND FAULT PROTECTION

- A. Generator circuit breaker: Molded-case, thermal magnetic type, 100% rated, complying with NEMA AB 1 and UL 489.
  - 1. Tripping Characteristics: Designed specifically for generator protection.
  - 2. Trip rating: Matched to generator rating.
  - 3. Shunt trip: Connected to trip breaker when generator is protected by other protective devices.
  - 4. Mounting: Adjacent to or integrated with control or monitoring panel.

### 2.13 GENERATOR, EXCITER AND VOLTAGE REGULATOR

- B. Comply with NEMA MG 1 and specified performance requirements.
- C. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
- D. Electrical Insulation: Class H or Class F.
- E. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.
- F. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity. Excitation shall use no slip or collector rings, or brushes, and shall be arranged to sustain generator output under short-circuit conditions as specified.
- G. Enclosure: Dripproof Instrument: Transformers: Mounted within generator enclosure.
- H. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
  - 1. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output voltage operating band.
  - 2. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
- I. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
- J. Subtransient Reactance: 12 percent, maximum.

### 2.14 OUTDOOR GENERATOR-SET ENCLOSURE

- A. Description: Vandal-resistant, weather-resistant steel housing, wind resistant up to 100 mph. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.
- B. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
  - 1. Louvers: Fixed-engine cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
  - 2. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.

## 2.15 FINISHES

- A. Indoor and Outdoor Enclosures and Components: Manufacturer's standard enamel over corrosion-resistant pretreatment and compatible standard primer.

## 2.16 SOURCE QUALITY CONTROL

- A. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
  - 1. Tests: Comply with NFPA 110, Level 1 energy converters in Paragraphs 3.2.1, 3.2.1.1, and 3.2.1.2.
  - 2. Generator Tests: Comply with IEEE 115.
  - 3. Components and Accessories: Items furnished with installed unit that are not identical to those on tested prototype shall have been factory tested to demonstrate compatibility and reliability.
- B. Project-Specific Equipment Tests: Before shipment, factory test engine-generator set and other system components and accessories manufactured specifically for this project. Perform tests at rated load and power factor. Include the following tests:
  - 1. Full load run.
  - 2. Maximum power
  - 3. Voltage regulation.
  - 4. Transient and steady-state governing.
  - 5. Single-step load pickup.
  - 6. Safety shutdown.

- C. Observation of Factory Tests: Provide 14 days advance notice of tests and opportunity for observation of tests by Owner's representative. Report factory test results within 10 days of completion of test.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATIONS**

- A. Examine areas, equipment bases, and conditions, with Installer present, for compliance with requirements for installation and other conditions affecting packaged engine-generator performance.
- B. Examine roughing-in of piping systems and electrical connections. Verify actual locations of connections before packaged engine-generator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 CONCRETE BASES**

- A. Coordinate size and location of concrete bases. Verify structural requirements with structural engineer.
- B. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods", and concrete materials and installation requirements are specified in Division 3. Refer to details on drawings for additional information.

### **3.3 INSTALLATION**

- A. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
- B. Install packaged engine generators level on concrete base.
  - 1. Vibration Isolation: Mount packaged engine generators on restrained spring isolators. Install packaged engine generator to provide access, without removing connection or accessories, for periodic maintenance. Install cooling-system piping, accessories, hangers and supports, and anchors for complete installation. Comply with requirements below for maximum spacing of supports.
  - 2. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
    - a. NPS 1 and Smaller: Maximum span, 7 feet; minimum rod size, ¼ inch.

- b. NPS 1-1/2: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - c. NPS 2 and Larger: Maximum span, 10 feet; minimum rod size, 3/8 inch.
3. Support cooling system piping with pipe hangers spaced horizontally and at each floor vertically.
  4. Restrain cooling-system piping with cable-type bracing assemblies.
  5. Extend drain piping from heat exchangers to point of disposition.
- C. Install exhaust-system piping: Extend to point of termination outside structure. Size piping according to manufacturer's written instructions.
1. Install condensate drain piping for engine exhaust system. Extend drain piping from low points of exhaust system and from muffler to condensate traps and to point of disposition.
  2. Support exhaust piping and muffler with pipe hangers spaced a maximum of 20 feet horizontally and at each floor vertically.
  3. Restrain exhaust piping and mufflers with cable-type bracing assemblies.
- D. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.

### 3.4 CONNECTIONS

- A. The following are specific connection requirements
1. Install fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
  2. Connect cooling-system water supply and drain piping to diesel engine heat exchangers. Install flexible connectors at connections to engine generator and remote radiator.
  3. Connect fuel piping to engines with a gate valve and union.
  4. Connect exhaust-system piping to engines.
- B. Ground equipment according to Division 16 Section "Grounding."
- C. Connect wiring according to Division 16 Section "Conductors and Cables."
- D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.5 IDENTIFICATION

- A. Identify system components according to Division 16 Section "Basic Electrical Materials and Methods."

### 3.6 FIELD QUALITY CONTROL

#### A. Manufacturer's Field Service

1. Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing. Perform the following field tests and inspections and prepare test reports:
  - a. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections 7.15.2.1 and 7.22.1 (except for vibration baseline test). Certify compliance with test parameters.
2. Perform tests recommended by manufacturer.
3. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, the following:
  - a. Single-step full-load pickup test.
4. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
  - a. Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
  - b. Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
  - c. Verify acceptance of charge for each element of the battery after discharge.
  - d. Verify that measurements are within manufacturer's specifications.
5. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
6. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
7. Exhaust Emissions Test: Comply with applicable government test criteria.
8. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
9. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits. Coordinate tests with tests for transfer switches and run them concurrently.

- B. Test instruments shall have been calibrated within the last 12 months, traceable to standards of the National Institute for Standards and Technology, and

adequate for making positive observation of test results. Make calibration records available for examination on request.

- C. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
- D. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
- E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Remove and replace malfunctioning units and retest as specified above.
- G. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
- H. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.

### **3.7 STARTUP SERVICE**

- A. Inspect field-assembled components and equipment installation, including piping and electrical connections. Report results in writing.
- B. Complete installation and startup checks according to manufacturer's written instructions.
- C. After all field-testing, training and demonstrations has been completed, the fuel tank shall be refilled to the "FULL" level. Fuel shall be treated with an additive to prevent thickening in cold weather conditions. Fuel additive shall be as recommended by the generator manufacturer.

### **3.8 DEMONSTRATION**

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.
  - 1. Coordinate this training with that for transfer switches.

**END OF SECTION 16231**

**SECTION 16452 - GROUNDING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes grounding of electrical systems and equipment and basic requirements for grounding for protection of life, equipment, circuits, and systems. Grounding requirements specified in this Section may be supplemented in other Sections of these Specifications.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 16 Section "Wires and Cables" for requirements for grounding conductors.

**1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for grounding rods, connectors and connection materials, and grounding fittings.
- C. Field tests and observation reports certified by the testing organization and indicating and interpreting the test reports for compliance with performance requirements.

**1.4 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with UL 467.



- C. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Apache Grounding; Nashville Wire Products.
  - 2. Boggs: H. L. Boggs & Co.
  - 3. Chance: A. B. Chance Co.
  - 4. Dossert Corp.
  - 5. Erico Inc.; Electrical Products Group.
  - 6. Galvan Industries, Inc.
  - 7. Hastings Fiber Glass Products, Inc.
  - 8. Heary Brothers Lightning Protection Co.
  - 9. Ideal Industries, Inc.
  - 10. ILSCO.
  - 11. Kearney.
  - 12. Korns: C. C. Korns Co.
  - 13. Lightning Master Corp.
  - 14. Lyncole XIT Grounding.
  - 15. O-Z/Gedney Co.
  - 16. Raco, Inc.
  - 17. Salisbury: W.H. Salisbury & Co., Utility.
  - 18. Thomas & Betts, Electrical.
  - 19. Utilco Co.

### **2.2 GROUNDING AND BONDING PRODUCTS**

- A. Governing Requirements: Where types, sizes, ratings, and quantities indicated are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating, and quantity indications govern.

### **2.3 WIRE AND CABLE GROUNDING CONDUCTORS**

- A. Comply with Division 16 Section "Wires and Cables." Conform to NEC Table 8, except as otherwise indicated, for conductor properties, including stranding.

- B. Equipment Grounding Conductors: Insulated with green color insulation.
- C. Grounding-Electrode Conductors: Stranded cable.
- D. Underground Conductors: Bare, tinned, stranded, except as otherwise indicated.
- E. Bare Copper Conductors: Conform to the following:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Assembly of Stranded Conductors: ASTM B 8.
  - 3. Tinned Conductors: ASTM B 33.

## 2.4 MISCELLANEOUS CONDUCTORS

- A. Grounding Bus: Bare, annealed-copper bars of rectangular cross section.
- B. Braided Bonding Jumpers: Copper tape, braided No. 30 AWG bare copper wire, terminated with copper ferrules.
- C. Bonding Straps: Soft copper, 0.05 inch thick and 2 inches wide, except as indicated.

## 2.5 CONNECTOR PRODUCTS

- A. Pressure Connectors: High-conductivity-plated units.
- B. Bolted Clamps: Heavy-duty type.
- C. Exothermic-Welded Connections: Provided in kit form and selected per manufacturer's written instructions for specific types, sizes, and combinations of conductors and connected items.

## 2.6 GROUNDING ELECTRODES

- A. Grounding Rods: Copper-clad steel.
  - 1. Size: 3/4 inch by 120 inches.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Equipment Grounding Conductors: Comply with NEC Article 250 for types, sizes, and quantities of equipment grounding conductors, except where specific types, larger sizes, or more conductors than required by NEC are indicated. Metallic raceways, metallic cable sheaths, etc. shall not be used for an equipment-grounding conductor.

NEC permits 2 basic types of equipment grounding conductors: metallic raceway or cable sheath that encloses circuit conductors (conditionally) or an equipment grounding conductor run with circuit conductors. Nine subparagraphs below indicate types for different circuit/equipment applications. Delete subparagraphs selectively and edit to suit Project.

1. Install equipment grounding conductor with circuit conductors for the items below in addition to those required by Code:
  - a. Feeders and branch circuits.
- B. Signal and Communication Systems: For telephone, alarm and other communication systems, provide a No. 4 AWG minimum insulated grounding conductor in raceway from grounding-electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
  1. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-2-by-12-inch grounding bus.
  2. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- C. Separately Derived Systems: Where NEC requires grounding, ground according to NEC Paragraph 250-26.
- D. Metal Poles Supporting Outdoor Lighting Fixtures: Ground pole to a grounding electrode in addition to separate equipment grounding conductor run with supply branch circuit.

### 3.2 INSTALLATION

- A. General: Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.

- B. Electrical Room Grounding Bus: Space 1 inch from wall and support from wall 6 inches above finished floor, except as otherwise indicated.
- C. Grounding Rods: Locate a minimum of 1-rod length from each other and at least the same distance from any other grounding electrode.
  - 1. Drive until tops are 2 inches below finished floor or final grade, except as otherwise indicated.
  - 2. Interconnect with grounding-electrode conductors. Use exothermic welds, except at test wells and as otherwise indicated. Make these connections without damaging copper coating or exposing steel.
- D. Grounding Conductors: Route along the shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- E. Underground Grounding Conductors: Use bare copper wire. Bury minimum 24 inches below finished grade.
- F. Metal Water Service Pipe: Provide insulated copper grounding conductors, sized as indicated, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes by grounding-clamp connectors. Where a dielectric main water fitting is installed, connect grounding conductor to street side of fitting. Do not install a grounding jumper across dielectric fittings. Bond grounding-conductor conduit to conductor at each end.
- G. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with grounding-clamp connectors.

### 3.3 CONNECTIONS

- A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
  - 1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.
  - 2. Make connections with clean, bare metal at points of contact.
  - 3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
- B. Exothermic-Welded Connections: Use for connections to structural steel and for underground connections. Comply with manufacturer's written instructions.

Welds that are puffed up or that show convex surfaces indicating improper cleaning are not acceptable.

- C. Equipment Grounding-Wire Terminations: For No. 8 AWG and larger, use pressure-type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure-type connectors.
- D. Noncontact Metal Raceway Terminations: Where metallic raceways terminate at metal housings without mechanical and electrical connection to housing, terminate each conduit with a grounding bushing. Connect grounding bushings with a bare grounding conductor to grounding bus or terminal in housing. Bond electrically noncontinuous conduits at both entrances and exits with grounding bushings and bare grounding conductors, except as otherwise indicated.
- E. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A and UL 486B.
- F. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by manufacturer of connectors. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.
- G. Moisture Protection: Where insulated grounding conductors are connected to grounding rods or grounding buses, insulate entire area of connection and seal against moisture penetration of insulation and cable.

### 3.4 FIELD QUALITY CONTROL

- A. Tests: Subject the completed grounding system to a megger test at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells. Measure ground resistance not less than 2 full days after the last trace of precipitation, and without the soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance. Perform tests by the 2-point method according to IEEE 81.
- B. Maximum grounding to resistance values are as follows:
  - 1. Equipment Rated 500 kVA and Less: 10 ohms.
  - 2. Equipment Rated 500 to 1000 kVA: 5 ohms.
  - 3. Equipment Rated More than 1000 kVA: 3 ohms.
  - 4. Unfenced Substations and Pad-Mounted Equipment: 5 ohms.
  - 5. Manhole Grounds: 10 ohms.

- C. Excessive Ground Resistance: Where resistance to ground exceeds specified values, notify Owner promptly and include recommendations to reduce ground resistance and to accomplish recommended work.
- D. Report: Prepare test reports, certified by the testing organization, of ground resistance at each test location. Include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

### **3.5 ADJUSTING AND CLEANING**

- A. Restore surface features, including vegetation, at areas disturbed by work of this Section. Reestablish original grades, except as otherwise indicated. Where sod has been removed, replace it as soon as possible after backfilling is completed. Restore areas disturbed by trenching, storing of dirt, cable laying, and other activities to their original condition. Include topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 2 Section "Landscaping." Maintain restored surfaces. Restore disturbed paving as indicated.

**END OF SECTION 16452**

**SECTION 16470 - PANELBOARDS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes lighting and appliance type panelboards and distribution panelboards and associated auxiliary equipment rated 600 V and less.
- B. Related Sections include the following:

List below only products, construction, and equipment for this Project that the reader might expect to find in this Section but are specified elsewhere. Verify that the Section titles listed below are correct for this Project's Specifications.

- C. Division 16 Section "Basic Electrical Materials and Methods" for general materials and installation methods.
- D. Division 16 Section "Electrical Identification" for labeling materials.

**1.3 SUBMITTALS**

- A. Product Data: For each type of panelboard, accessory item, and component specified.
- B. Shop Drawings: For panelboards. Include dimensioned plans, sections, and elevations. For each individual panelboard, show tabulations of installed devices, major features, and voltage rating. Include the following:
- C. Enclosure type with details for types other than NEMA 250, Type 1.
- D. Bus configuration, current ratings and material.
- E. Short-circuit current rating of panelboard.

- F. Features, characteristics, ratings, and factory settings of individual protective devices and auxiliary components.
- G. Wiring Diagrams: Details of schematic diagram including control wiring and differentiating between manufacturer-installed and field-installed wiring.
- H. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- I. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- J. Maintenance Data: For panelboard components to include in the maintenance manuals specified in Division 1. Include manufacturer's written instructions for testing circuit breakers.

#### **1.4 QUALITY ASSURANCE**

- A. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
- B. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- C. Comply with NFPA 70.
- D. Comply with NEMA PB 1.

#### **1.5 EXTRA MATERIALS**

- A. Revise quantity below to suit Project.
- B. Extra materials may not be allowed for publicly funded projects.
- C. Keys: 6 spares of each type for panelboard cabinet lock.

#### **1.6 DEFINITIONS**

- A. "Panelboards", as referenced herein, shall include lighting and appliance panels, load centers and distribution panels.
- B. "Space" means complete provision for future installation of branch or feeder device, including mounting provisions and bus ties.
- C. "Spare" means completely installed branch or feeder device for future use.



**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Retain or insert only those manufacturers below whose products correspond with other requirements and whose availability and suitability for application have been verified.
- C. See Editing Instruction No. 1 in the Evaluations for cautions about naming products and manufacturers.
  - 1. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
  - 2. General Electric Co.; Electrical Distribution & Control Div.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D Co.

**2.2 PANELBOARD FABRICATION**

- A. Enclosures: Flush- or surface-mounted cabinets as indicated. NEMA PB 1, Type 1, unless otherwise indicated to meet environmental conditions at installed location.
- B. Front: Secured to box with concealed trim clamps, unless otherwise indicated. Front for surface-mounted panelboards shall be same dimensions as box. Fronts for flush panelboards shall overlap box, unless otherwise indicated.
- C. Directory Frame: Metal, mounted inside each panelboard door.
- D. Bus: Hard drawn copper of 98 percent conductivity.
- E. Main and Neutral Lugs: Compression type.
- F. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box.
- G. Service Equipment Approval: Listed for use as service equipment for distribution panelboards with main service disconnect.
- H. Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the overcurrent protective device ampere ratings indicated for future installation of devices.
- I. Feed-through Lugs: Sized to accommodate feeders indicated.

### 2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- B. Doors: In panelboard front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike.

### 2.4 DISTRIBUTION PANELBOARDS

- A. Doors: In panelboard front, except omit in fusible-switch panelboard, unless otherwise indicated. Secure door with vault-type latch with tumbler lock, all keyed alike.
- B. Branch-Circuit Breakers: Where overcurrent protective devices are indicated to be circuit breakers, use bolt-on circuit breakers, except circuit breakers 225-A frame size and greater may be plug-in type where individual positive-locking device requires mechanical release for removal.

### 2.5 OVERCURRENT PROTECTIVE DEVICES

- A. Molded-Case Circuit Breaker: NEMA AB 1, handle lockable.
- B. Characteristics: Frame size, trip rating, number of poles, and auxiliary devices as indicated and interrupting capacity rating to meet available fault current.
- C. Application Listing: Appropriate for application, including Type SWD for switching fluorescent lighting loads and Type HACR for heating, air-conditioning, and refrigerating equipment.
- D. Circuit Breakers, 200 A and Larger: Trip units interchangeable within frame size.
- E. Circuit Breakers, 400 A and Larger: Field-adjustable short time and continuous current settings.
- F. Lugs: Mechanical lugs and power-distribution connectors for number, size, and material of conductors indicated.
- G. Minimum interrupting rating: 10,000 Amps RMS symmetrical for 208/120V breakers, unless noted otherwise on drawings.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install panelboards and accessory items according to NEMA PB 1.1.
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Mounting: Plumb and rigid without distortion of box.
- D. Circuit Directory: Type directory to indicate installed circuit loads after balancing panelboard loads. Obtain approval before installing.
- E. Install filler plates in unused spaces.
- F. Wiring in Panelboard Gutters: Arrange conductors into groups, and bundle and wrap with wire ties after completing load balancing.

**3.2 IDENTIFICATION**

- A. Identify field-installed wiring and components and provide warning signs as specified in Division 16 Section "Electrical Identification."
- B. Panelboard Nameplates: Label each panelboard with engraved laminated-plastic nameplates mounted with corrosion-resistant screws.

**3.3 GROUNDING**

- A. Coordinate 2 paragraphs below with Drawings.
- B. Make equipment-grounding connections for panelboards as indicated.

**3.4 CONNECTIONS**

- A. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

**3.5 FIELD QUALITY CONTROL**

- A. Prepare for acceptance tests as follows:

- B. Make insulation-resistance tests of each panelboard bus, component, and connecting supply, feeder, and control circuits.
- C. Make continuity tests of each circuit.
- D. Testing: After installing panelboards and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
- E. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.6 for molded-case circuit breakers. Certify compliance with test parameters.
- F. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units, and retest.
- G. Balancing Loads: After Substantial Completion, conduct load-balancing measurements and make circuit changes as follows:
- H. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as required to meet this minimum requirement.

### 3.6 ADJUSTING

- A. The following paragraph assumes that settings are indicated on a drawing or coordination study report for the Contractor to use.
- B. Set field-adjustable switches and circuit breaker trip ranges as indicated.

### 3.7 CLEANING

- A. On completion of installation, inspect interior and exterior of panelboards. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish.

**END OF SECTION 16470**

**SECTION 16475 - FUSES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Fuses (rated for circuits 600 Volts and less).

**1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each fuse type specified.
- C. Product Data for each fuse type specified. Include the following:
  - 1. Descriptive data and time-current curves.
  - 2. Let-through current curves for fuses with current-limiting characteristics.
  - 3. Coordination charts and tables and related data.
  - 4. Fuse size for elevator feeder and disconnect applications.
- D. Field test reports indicating and interpreting test results.
- E. Maintenance data for tripping devices to include in the operation and maintenance manual specified in Division 1.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain fuses from one source and by a single manufacturer.
- B. Comply with NFPA 70 for components and installation.

- C. Listing and Labeling: Provide fuses specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide fuses by one of the following:
  - 1. Cooper Industries, Inc.; Bussmann Div.
  - 2. Gould-Shawmut
  - 3. Littlefuse

### **2.2 CARTRIDGE FUSES**

- A. General: Except as otherwise indicated, provide fuses of types, sizes, ratings, and average time-current and peak let-through current characteristics indicated, which comply with manufacturer's standard design, materials, and constructed in accordance with published product information, and with industry standards and configurations. All fuses shall be rated for 600 volts and 200,000 A.I.C.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine utilization equipment nameplates and installation instructions to verify proper fuse locations, sizes, and characteristics.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### **3.2 FUSE APPLICATIONS - 600 Volts and Less**

- A. Circuits 1/10 to 600 Amperes shall be protected by U. L. Class RD-1, dual-element, time-delay fuses (with spring activated overload element). Bussmann Low-Peak LPJ-SP.

- B. Circuits 601 to 6,000 Amperes shall be protected by U.L. Class L fuses with a minimum of four (4) seconds time delay at 500% rated current, and with pure silver links to ensure maximum current limitation. Bussmann HI-CAP KRP-C.

### 3.3 INSTALLATION

- A. Install fuses in fusible devices as indicated. Arrange fuses so fuse ratings are readable without removing fuse.

### 3.4 IDENTIFICATION

- A. Install typewritten labels on inside door of each fused switch to indicate fuse replacement information.

END OF SECTION 16475

**SECTION 16476 - DISCONNECT SWITCHES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes individually mounted switches used for the following:
  - 1. Equipment disconnect switches.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 16 Section "Wiring Devices" for attachment plugs and receptacles, and snap switches used for disconnect switches.
  - 2. Division 16 Section "Fuses" for fuses in fusible disconnect switches.

**1.3 SUBMITTALS**

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for disconnect switches, circuit breakers, and accessories specified in this Section.
- C. Wiring diagrams detailing wiring for power and control systems and differentiating between manufacturer-installed and field-installed wiring.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain disconnect switches and circuit breakers from one source and by a single manufacturer.
- B. Comply with NFPA 70 for components and installation.
- C. Listing and Labeling: Provide disconnect switches and circuit breakers specified in this Section that are listed and labeled.



1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide disconnect switches and circuit breakers by one of the following:
  1. Fusible and Non-fusible Switches:
    - a. Eaton Corp.; Westinghouse and Cutler-Hammer Products.
    - b. General Electric Co.; Electrical Distribution and Control Division.
    - c. Siemens Energy & Automation, Inc.
    - d. Square D Co.

### 2.2 DISCONNECT SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.
- B. Enclosed, Fusible Switch, 800 A and Smaller: NEMA KS 1, Type HD, clips to accommodate specified fuses, enclosure consistent with environment where located, handle lockable with 2 padlocks, and interlocked with cover in CLOSED position.
- C. Enclosed fusible switch with integral shunt trip mechanism: 600 VAC, 3 pole, 200,000 Amp RMS symmetrical interrupting rating, 120 Volt shunt trip, control power terminal block, ground lug, suitable for use with Class J fuses only. Equip unit with control power transformers having primary and secondary fuses, isolation relay, key operated test button, pilot light, isolated neutral lug as required to meet functional requirements. Bussman "PS" series or approved equal.
- D. Enclosure: NEMA KS 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed location.
  1. Outdoor Locations: Type 3R.

**PART 3 - EXECUTION****3.1 INSTALLATION**

- A. Install disconnect switches in locations as indicated, according to manufacturer's written instructions.
- B. Install disconnect switches level and plumb.
- C. Install wiring between disconnect switches, control, and indication devices.
- D. Connect disconnect switches and components to wiring system and to ground as indicated and instructed by manufacturer.
  - 1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- E. Identify each disconnect switch according to requirements specified in Division 16 Section "Electrical Identification."

**3.2 FIELD QUALITY CONTROL**

- A. Testing: After installing disconnect switches and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Section 7.5 for disconnect switches. Certify compliance with test parameters.
- B. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, remove and replace with new units and retest.

**3.3 CLEANING**

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish including chips, scratches, and abrasions.

**END OF SECTION 16476**

**SECTION 16481 - MOTOR CONTROLLERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes ac motor-control devices rated 600 V and less that are supplied as enclosed units.
- B. Related Sections include the following:
  - 1. Division 16 Section "Basic Electrical Materials and Methods" for general materials and installation methods.
  - 2. Division 16 Section "Electrical Identification" for labeling materials.
  - 3. Division 16 Section "Fuses."

**1.3 SUBMITTALS**

- A. Product Data: For products specified in this Section. Include dimensions, ratings, and data on features and components.
- B. Maintenance Data: For products to include in the maintenance manuals specified in Division 1.
- C. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.

**1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain similar motor-control devices through one source from a single manufacturer.
- B. Comply with NFPA 70.

- C. Listing and Labeling: Provide motor controllers specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

## 1.5 COORDINATION

- A. Coordinate features of controllers and accessory devices with pilot devices and control circuits to which they connect.
- B. Coordinate features, accessories, and functions of each motor controller with the ratings and characteristics of the supply circuit, the motor, the required control sequence, and the duty cycle of the motor and load.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Corp.; Westinghouse & Cutler-Hammer Products.
  - 2. General Electric Co.; Electrical Distribution & Control Div.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D Co.

### 2.2 MANUAL MOTOR CONTROLLERS

- A. Description: NEMA ICS 2, general purpose, Class A with toggle action and overload element.
- B. Fractional HP Manual Controllers: Provide single-phase fractional HP manual motor controllers, of sizes and ratings indicated. Equip with manually operated quick-make, quick-break toggle mechanisms; and with one-piece melting alloy type thermal units. Controller to become inoperative when thermal unit is removed. Provide controllers with double break silver alloy contacts, visible from both sides of controller; green pilot lights, and switch capable of being padlocked-OFF. Enclose controller unit in NEMA Type 1 general purpose enclosure. Coat with manufacturer's standard color finish. Controllers shall be flush mounted in finished spaces and surface mounted in unfinished spaces.

## 2.3 MAGNETIC MOTOR CONTROLLERS

- A. Combination Starter/Disconnect switch: Provide magnetic/combination starters consisting of a full voltage, non-reversing, across-the-line type magnetic motor starter and a fusible heavy duty disconnect switch mounted in a common enclosure.
1. Magnetic starters shall be of NEMA size required by load served, equipped with overload relays in each ungrounded phase and 1 "NO" and 1 "NC" auxiliary contact in addition to the normal seal-in contact and the auxiliary contacts required for interlocking and pilot lights. Minimum starter size shall be NEMA O. Provide a red pilot light to indicate motor "running", and a green pilot light to indicate motor "off".
  2. Control circuit shall be 120 volts with individual control power transformer secondary fused, with control terminals for external connections. Provide control requirements as indicated and as required by temperature control. When required, "start-stop" control shall be connected to the "auto" position of the H-O-A selector switch.
  3. Provide all modification kits and accessories required to achieve all interlocking, control and automation requirements. Control power circuit shall be disconnected upon opening the fusible switch.
  4. Heater elements for overload relays except starters factory pre-wired with equipment, shall be furnished and installed in field by this Contractor. Provide properly sized heater elements by taking into account duty cycle, type starting, ambient temperature of motor and starter, and use of power factor correction capacitors. Overload relays shall be based upon motor nameplate full-load Amperes (FLA).
  5. Fusible switches shall be quick-make, quick-break, equipped with deionizing grids and silver allow contacts readily visible with switch door open for normal safety. Contacts shall be over-travel to compensate for normal wear and ensure positive connections. Fuse holders shall be of the high pressure type using compression coil spring located out of heat zone. Fuse holders shall be rejection type to accept fuses as specified in Section 16475, "Fuses" (maximum 600 Amps). Switches shall be capable of being padlocked in the "ON" and "OFF" positions. Units shall be interlocked to prevent opening access door while switch is "ON". Provision for defeating interlock for authorized inspection shall be provided. For H-O-A switches, provide a three position selector switch mounted in front door of each combination starter/disconnect switch.
- B. Magnetic, Across the Line, Full Voltage, Non-Reversing: Provide magnetic starters with ratings adequate to withstand and interrupt the fault currents available. Starters shall be factory assembled and contain:
1. A magnetic starter of NEMA size required equipped with overload relays in each ungrounded phase 1 "NO" and 1 "NC" auxiliary contact in addition to the normal seal-in contact and the auxiliary contacts required for

interlocking and pilot lights. Minimum starter size shall be NEMA O. Provide a H-O-A, three position selector switch mounted in the front cover. Provide a red pilot light to indicate motor running and a green pilot light to indicate motor off.

2. A control circuit of 120 volts, with individual control power transformer secondary fused, with control terminals for remote controls brought out to terminals for external connections. Provide control requirements as indicated and as required by temperature control. When required, "start-stop" control shall be connected to the "auto" position of the H-O-A selector switch. Provide modification kits and accessories as are required to meet the functional requirements indicated.
3. Heater elements for overload relays except starters factory pre-wired with equipment, shall be furnished and installed in field by this Contractor. Provide properly sized heater elements by taking into account duty cycle, type starting, ambient temperature of motor and starter, and use of power factor correction capacitors. Overload relays shall be based upon motor nameplate full-load Amperes (FLA).

## 2.4 ENCLOSURES

- A. Description: Flush or surface-mounted cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to meet environmental conditions at installed location.
  1. Outdoor Locations: NEMA 250, Type 3R.

## 2.5 ACCESSORIES

- A. Devices are factory installed in controller enclosure, unless otherwise indicated.
- B. Pilot Lights and Selector Switches: NEMA ICS 2, heavy-duty type.
- C. Control Relays: Auxiliary and adjustable time-delay relays.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Select features of each motor controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, drive, and load; and configuration of pilot device and control circuit affecting controller functions.
- B. Select horsepower rating of controllers to suit motor controlled.

- C. Use fractional-horsepower manual controllers for single-phase motors, unless otherwise indicated.
- D. Hand-Off-Automatic Selector Switches: In covers of manual and magnetic controllers of motors started and stopped by automatic controls or interlocks with other equipment.

### 3.2 INSTALLATION

- A. Install independently mounted motor-control devices according to manufacturer's written instructions.
- B. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components, including the pretesting and adjustment of solid-state controllers.
- C. Location: Locate controllers within sight of motors controlled, unless otherwise indicated.
- D. For control equipment at walls, bolt units to wall. For controllers not at walls, provide freestanding racks conforming to Division 16 Section "Basic Electrical Materials and Methods."
- E. Motor-Controller Fuses: Install indicated fuses in each fusible switch.

### 3.3 IDENTIFICATION

- A. Identify motor-control components and control wiring according to Division 16 Section "Electrical Identification."

### 3.4 CONTROL WIRING INSTALLATION

- A. Install wiring between motor-control devices according to Division 16 Section "Wires and Cables."
- B. Bundle, train, and support wiring in enclosures.
- C. Connect hand-off-automatic switch and other automatic control devices where available.
  - 1. Connect selector switches to bypass only the manual and automatic control devices that have no safety functions when switch is in the hand position.
  - 2. Connect selector switches with motor-control circuit in both hand and automatic positions for safety-type control devices such as low- and high-

pressure cutouts, high-temperature cutouts, and motor overload protectors.

### 3.5 CONNECTIONS

- A. Tighten connectors, terminals, bus joints, and mountings. Tighten field-connected connectors and terminals, including screws and bolts, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.6 FIELD QUALITY CONTROL

- A. Testing: After installing motor controllers and after electrical circuitry has been energized, demonstrate product capability and compliance with requirements.
  - 1. Procedures: Perform each visual and mechanical inspection and electrical test stated in NETA ATS, Sections 7.5, 7.6, and 7.16. Certify compliance with test parameters.
  - 2. Remove and replace malfunctioning units with new units, and retest.

### 3.7 CLEANING

- A. Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally, using methods and materials recommended by manufacturer.

**END OF SECTION 16481**



**SECTION 16495 - TRANSFER SWITCHES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes automatic transfer switches (ATS) rated 600 V and less.

**1.3 SUBMITTALS**

- A. Shop drawings or published product data for each transfer switch, including dimensioned plans, sections, and elevations showing minimum clearances; conductor entry provisions; gutter space; installed features and devices; and materials lists. Wiring diagrams, elementary or schematic, differentiating between manufacturer-installed and field-installed wiring.
- B. Operation and maintenance data for each type of product, for inclusion in Operating and Maintenance Manual specified in Division 1. Include all features and operating sequences, both automatic and manual. List all factory settings of relays and provide relay setting and calibration instructions.

**1.4 QUALITY ASSURANCE**

- A. Emergency Service: Manufacturer shall maintain a service center capable of providing emergency maintenance and repairs at the Project site with a 2-hour maximum response time.
- B. Comply with NFPA 110, "Standard for Emergency and Standby Power Systems."
- C. Comply with NEMA ICS 1, "General Standards for Industrial Control," ICS 2, "Industrial Control Devices, Controllers and Assemblies," and ICS 6, "Enclosures for Industrial Controls and Systems."
- D. UL Compliance: Comply with UL Standard 1008, "Automatic Transfer Switches," except where requirements of these Specifications are more stringent.

**1.5 COORDINATION**

- A. Coordinate layout and installation with all other trades and with the owner.
- B. Coordinate schedule for start-up and testing with the generator start-up.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Onan.
  - 2. Automatic Switch Co.
  - 3. Russelectric, Inc.
  - 4. GE/Zenith Controls, Inc.
  - 5. Caterpillar.
  - 6. Generac.

**2.2 TRANSFER SWITCH PRODUCTS, GENERAL**

- A. Current and Voltage Ratings: As indicated.
- B. Transition between phase conductors of the two sources shall be open.
- C. Tested Fault-Current Ratings: Closing and withstand ratings shall exceed the indicated available rms symmetrical fault current at the equipment terminals based on testing according to UL Standard 1008, conducted at full-rated system voltage and 20 percent power factor.
- D. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 deg C to 70 deg C.
- E. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage surge withstand capability requirements when tested according to ANSI C37.90.1, IEEE Guide for Surge Withstand Capability (SWC) Tests.
- F. Provide 100 percent ampacity neutral switching (4-pole).
- G. Enclosures: General-purpose NEMA 1, conforming to UL Standard 508, "Electric Industrial Control Equipment," except as otherwise indicated.

- H. Factory Wiring: Train and bundle factory wiring and identify consistently with shop drawings, either by color code or by numbered or lettered wire and cable tape markers at terminations.
- I. Terminals: Pressure-type, suitable for copper or aluminum conductors of sizes indicated. Terminals used for control of the ATS shall be binding head screw type with either ring type or upturned spade type wire terminations.
- J. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
- K. Electrical Operation: Where indicated, accomplish by a non-fused, momentarily energized solenoid or electric motor-operated mechanism, mechanically and electrically interlocked in both directions.
- L. Power Switching Action: Mechanically held in both directions for double-throw switches.
- M. Power Switching Contacts: Use silver composition for switching load current. Units rated 225 amperes and more shall have separate arcing contacts. Switch contacts shall be completely visible for inspection without requiring disassembly or relocation of components, beyond removing a single cover over the normal or emergency contacts. Circuit breakers and enclosed contractors are not acceptable.

### 2.3 AUTOMATIC TRANSFER SWITCHES (ATS)

- A. Comply with Level 1 equipment according to NFPA 110, "Standard for Emergency and Standby Power Systems."
- B. Power Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning except as indicated. ATS shall also be capable of manual operation under load with the door closed with either or both sources energized. Transfer time shall be the same as for electrical operation. The control circuit shall automatically disconnect from the electrical operator during manual operation.
- C. Signal-Before-Transfer Contacts: One set of normally open and one set of normally closed dry contacts shall operate in advance of transfer to emergency source and another set of normally open and set of normally closed shall operate in advance of transfer to the normal source. These contacts shall have an adjustable advance interval of 0.5 to 30 seconds and shall be independently adjustable in the emergency and normal transfer directions.

- D. Normal Voltage Sensing and Timing Relay Sense each phase of the normal source. Pick-up voltage shall be adjustable from 85 percent to 100 percent of nominal, and drop-out voltage shall be adjustable from 75 percent to 98 percent pick-up value. Factory set the pick-up at 90 percent and the drop-out at 85 percent. Provide adjustable time-delay, adjustable over the range of at least 0.5 to 6 seconds, before activating engine start contacts.
- E. Voltage, Frequency and Timing Relay for Transfer to Emergency Source: Voltage pick-up shall be adjustable from 85 percent to 100 percent of nominal. Factory set the pick-up at 90 percent. Pick-up frequency shall be adjustable from 90 percent to 100 percent of nominal. Factory set the pick-up at 95 percent. Provide timer that is adjustable over the range of at least 0.1 to 5 seconds that delays transfer to emergency source after voltage and frequency parameters are satisfied.
- F. Voltage and Timing Relay for Retransfer to Normal Source: Relay shall pick up when normal power has been restored within the parameters indicated under Normal Voltage Sensing and Timing Relay above. A separate time delay, adjustable over the range of at least 5 seconds to 30 minutes, and factory set at 10 minutes shall be provided. Provide immediate retransfer to normal power, without this time delay, if emergency power fails, or drops below 75 percent for at least 10 seconds.
- G. Test Switch: Simulates normal source failure.
- H. Indicator Lights: Indicator lights shall be Light Emitting Diode (LED) type, with a minimum intensity of 200 milli candelas, and a minimum life of 50,000 hours.
- I. Switch-Position Pilot Lights: Indicate source to which the load is connected.
- J. Source-Available Indicating Lights: Supervise sources via the transfer switch normal and emergency source-sensing circuits. Provide green visual indicator with nameplate engraved "Normal Source Available", and red visual indicator with nameplate engraved "Emergency Source Available".
- K. Unassigned Auxiliary Contacts: Provide two normally open SPDT contacts, each rated at least 10 amperes at 240 volts ac, for each switch position.
- L. Engine Starting Contacts: One isolated normally closed and one isolated normally open. Contacts shall be gold flashed or gold plated and rated at least 10 amperes at a minimum of 32 volts dc.
- M. Engine Shut-Down Contacts and Timer: Contacts shall be as specified for Engine Starting Contacts and shall include a time delay adjustable over the range of at least 10 seconds to 5 minutes. Factory set the delay for 5 minutes.

- N. Engine-Generator Exerciser: Solid-state programmable timer shall start the engine-generator set and transfer load from the normal source to the engine-generator for a preset time, then retransfer and shut down the engine-generator after a preset cool-down period. The engine-generator load time shall be adjustable over the range of at least 20 minutes to 4 hours. The exerciser shall be provided with a cycle timer, adjustable over the range of at least one to thirty days, which shall initiate each exercise cycle. Exerciser features shall include:
1. Exerciser transfer selector switch, which permits selection between exercise with and without load transfer.
  2. Push button programming controls with digital display of settings.
  3. Integral battery operation of time switch when normal control power is not available.

## 2.4 FINISHES

- A. Enclosures: Manufacturer's standard enamel over corrosion-resistant pretreatment and primer.

## 2.5 SOURCE QUALITY CONTROL

- A. Factory test components, assembled switches, and associated equipment to ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for conformance with specified requirements. Perform dielectric strength test conforming to indicated standards.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install the transfer switches in accordance with manufacturers instructions and the conditions of the site.
- B. Identify components according to Division 16 Section "Electrical Identification."

### 3.2 CONNECTIONS

- A. Tighten factory-made connections, including connectors, terminals, bus joints, mountings, and grounding. Tighten field-connected connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque tightening values. When manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Standards 486A and 486B.

### 3.3 GROUNDING

- A. Make equipment grounding connections for transfer switch units as indicated and as required by the NEC.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to supervise field tests.
- B. Preliminary Tests: Perform electrical tests as recommended by the manufacturer and as follows:
  - 1. Measure phase-to-phase and phase-to-ground insulation resistance levels with insulation resistance tester. Use test voltages and procedure recommended by the manufacturer. Meet manufacturer's specified minimum resistance.
  - 2. Check for electrical continuity of circuits and for short circuits.

### 3.5 FIELD TESTS

- A. Give 7-day advance notice of the tests and perform tests in presence of owner's representative. A service technician certified by the switch manufacturer shall perform the field tests.
  - 1. Coordinate tests with tests of generator plant and run them concurrently.
  - 2. Tests: As recommended by the manufacturer and as follows:
    - a. Contact Resistance Test: Measure resistance of power contacts for each ATS. Resolve values in excess of 500 micro-ohms and differences between adjacent poles exceeding 50 percent.
    - b. Operational Tests: Demonstrate interlock, sequence, and operational function for each switch at least 3 times.

- c. Simulate power failures of normal source to ATs and of emergency source with normal source available.
    - d. Verify time-delay settings and pick-up and drop-out voltages.
  - 3. Test Failures: Correct deficiencies identified by tests and prepare for retest. Verify that equipment meets the specified requirements.
- B. Reports: Maintain a written record of observations and tests. Report defective materials and workmanship and retest corrected items. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

### 3.6 DEMONSTRATION

- A. Training: Furnish the services of a factory-authorized service representative to instruct Owner's personnel in the operation, maintenance, and adjustment of transfer switches and related equipment. Provide a minimum of 4 hours of instruction scheduled 7 days in advance.

**END OF SECTION 16495**

**SECTION 16511 - INTERIOR LIGHTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes interior lighting fixtures, lighting fixtures mounted on exterior building surfaces, lamps, ballasts, emergency lighting units, and accessories.
- B. Related Sections include the following:
  - 1. Division 16 Section "Lighting Control Equipment" for programmable lighting control systems, time switches, additional photoelectric relays, power relays, and contactors.

**1.3 SUBMITTALS**

- A. Product Data: Submit fixture product data in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical order. At a minimum, include the following information:
  - 1. Data sheets with the proposed fixture and all accessories clearly indicated.
  - 2. Dimensions of fixtures.
  - 3. Certified results of laboratory tests for fixtures and lamps for photometric performance.
  - 4. Emergency lighting unit battery and charger.
  - 5. Fluorescent and high-intensity-discharge ballasts.
  - 6. Types of lamps.
- B. Coordination Drawings: Reflected ceiling plans and sections drawn to scale and coordinating fixture installation with ceiling grid, ceiling-mounted items, and other components in the vicinity. Include work of all trades that is to be installed near lighting equipment.



- C. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- D. Maintenance Data: For lighting fixtures to include in maintenance manuals specified in Division 1.

#### **1.4 QUALITY ASSURANCE**

- A. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- B. Comply with NFPA 70.
- C. NFPA 101 Compliance: Comply with visibility and luminance requirements for exit signs.

#### **1.5 COORDINATION**

- A. Fixtures, Mounting Hardware, and Trim: Coordinate layout and installation of lighting fixtures with ceiling system and other construction.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Lighting Fixture Schedule on the drawings.

#### **2.2 FIXTURES AND FIXTURE COMPONENTS, GENERAL**

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position.

### 2.3 FLUORESCENT LAMP BALLASTS

- A. General Requirements: Unless otherwise indicated, features include the following:
  - 1. Designed for type and quantity of lamps indicated at full light output.
- B. Electronic Ballasts for Linear Lamps: Electronic integrated circuit, solid-state, full-light-output, energy-efficient type compatible with lamps and lamp combinations to which connected unless otherwise indicated, features include the following:
  - 1. Certification by Electrical Testing Laboratory (ETL).
  - 2. Labeling Certified Ballast Manufacturers Association (CMB).
  - 3. Type: Class P, high power factor, instant start type except as otherwise indicated.
  - 4. Sound Rating: 'A' rating, except as otherwise indicated.
  - 5. Voltage: Match connected circuits.
  - 6. Lamp Flicker: Less than 5 percent.
  - 7. Minimum Power Factor: 90 percent.
  - 8. Total Harmonic Distortion (THD) of Ballast Current: Less than 10 percent.
  - 9. Conform to FCC Regulations Part 15: Subpart J for electromagnetic interference.
  - 10. Conform to IEEE C62-41, Category A, for resistance to voltage surges for normal and common modes.
  - 11. Multilamp Ballasts: Use 2, 3, or 4 lamp ballasts for multilamp fixtures where possible.
  - 12. Lamp-ballast connection method does not reduce normal rated life of lamps.
  - 13. Acceptable Manufacturers: Advance "Centium" series or approved equivalent by Magnetek, Motorola or Valmont.

### 2.4 HIGH-INTENSITY-DISCHARGE LAMP BALLASTS

- A. General: Comply with ANSI C82.4. Unless otherwise indicated, features include the following:
  - 1. Type: Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.
  - 2. Operating Voltage: Match system voltage.
  - 3. Minimum Starting Temperature: Minus 22 deg F for single lamp ballasts.
  - 4. Normal Ambient Operating Temperature: 104 deg F.
  - 5. Open-circuit operation that will not reduce average life.
- B. Encapsulation: Manufacturer's standard epoxy-encapsulated model designed to minimize audible fixture noise.

## 2.5 EXIT SIGNS

- A. General Requirements: Comply with UL 924 and the following:
  - 1. Sign Colors and Lettering Size: Comply with authorities having jurisdiction.
- B. Internally Lighted Signs: As follows:
  - 1. Lamps for AC Operation: Light-emitting diodes, 70,000 hours minimum rated lamp life.
  - 2. Additional Lamps for DC Operation: Two minimum, bayonet-base type, for connection to external dc source.
- C. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
  - 1. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty.
  - 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
  - 3. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

## 2.6 EMERGENCY FLUORESCENT POWER SUPPLY UNIT

- A. Internal Type: Self-contained, modular, battery-inverter unit factory mounted within fixture body. Comply with UL 924.
  - 1. Test Switch and Light-Emitting Diode Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
  - 2. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
  - 3. Charger: Fully automatic, solid-state, constant-current type.
  - 4. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.

## 2.7 LAMPS

- A. Fluorescent Color Temperature and Minimum Color-Rendering Index: 3500 K and 85 CRI, unless otherwise indicated.

- B. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.

## 2.8 FIXTURE SUPPORT COMPONENTS

- A. Comply with Division 16 Section "Basic Electrical Materials and Methods," for channel- and angle-iron supports.
- B. Rod Hangers: 3/16-inch- minimum diameter, cadmium-plated, threaded steel rod.
- C. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

## 2.9 FINISHES

- A. Fixtures: Manufacturer's standard, unless otherwise indicated.
  - 1. Paint Finish: Applied over corrosion-resistant treatment or primer, free of defects.
  - 2. Metallic Finish: Corrosion resistant.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Fixtures: Set level, plumb, and square with ceiling and walls, and secure according to manufacturer's written instructions and approved submittal materials. Install lamps in each fixture.
- B. Support for Fixtures in Grid-Type Suspended Ceilings:
  - 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from fixture corners.
  - 2. Support Clips: Fasten to fixtures and to ceiling grid members at or near each fixture corner.
  - 3. Fixtures of Sizes Less Than Ceiling Grid: Arrange as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
- C. Suspended Fixture Support: As follows:
  - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.

2. Pendant mounted fixtures shall be seismically braced in accordance with the requirements of the 2002 International Building Code.

### 3.2 CONNECTIONS

- A. Ground equipment.
  1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.3 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Provide instruments to make and record test results.
- C. Tests: As follows:
  1. Verify normal operation of each fixture after installation.
  2. Emergency Lighting: Interrupt electrical supply to demonstrate proper operation.
  3. Verify normal transfer to battery source and retransfer to normal.
- D. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.
- E. Corrosive Fixtures: Replace during warranty period.

### 3.4 CLEANING AND ADJUSTING

- A. Clean fixtures internally and externally after installation. Use methods and materials recommended by manufacturer.

**END OF SECTION 16511**

**SECTION 16521 - EXTERIOR LIGHTING****PART 1 - - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes exterior lighting units with luminaires, lamps, ballasts, poles/support structures, and accessories.
- B. Related Sections include the following:
  - 1. Division 16 Section "Interior Lighting" for interior fixtures, lamps, ballasts, emergency lighting units, and accessories; and for exterior luminaires normally mounted on buildings.
  - 2. Division 16 Section "Lighting Control Equipment" for programmable lighting control systems.

**1.3 DEFINITIONS**

- A. Lighting Unit: A luminaire or an assembly of luminaires complete with a common support, including pole, post, or other structure, and mounting and support accessories.
- B. Luminaire (Light Fixture): A complete lighting device consisting of lamp(s) and ballast(s), when applicable, together with parts designed to distribute light, to position and protect lamps, and to connect lamps to power supply.

**1.4 SUBMITTALS**

- A. Product Data: For each type of lighting unit indicated, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
  - 1. Materials and dimensions of luminaires and poles.

2. Certified results of laboratory tests for fixtures and lamps for photometric performance.
  3. High-intensity-discharge luminaire ballasts.
- B. Shop Drawings: Anchor-bolt templates keyed to specific poles and certified by manufacturer.
- C. Maintenance Data: For lighting units to include in maintenance manuals specified in Division 1.
- D. Illumination Data: Provide a full size drawing of the project site indicating maintained footcandle values on horizontal pavement surface which shows point-by-point composite values of illuminance projected from the arrangement of light sources from indicated fixture locations and heights. Show on drawing the locations, spacings, luminaires, roadways, driveways, outline of building, walkways, etc. Grid spacing for point-by-point values shall be 10 feet by 10 feet.

## 1.5 QUALITY ASSURANCE

- A. Luminaires and Accessories: Listed and labeled as defined in NFPA 70, Article 100, for their indicated use, location, and installation conditions by a testing agency acceptable to authorities having jurisdiction
- B. Comply with ANSI C2.
- C. Comply with NFPA 70.

## 1.6 DELIVERY, STORAGE, AND HANDLING OF POLES

- A. Store poles on decay-resistant treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
- B. Retain factory-applied pole wrappings on metal poles until just before pole installation. Handle metal poles with web fabric straps.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Lighting Fixture Schedule on the drawings.

## 2.2 LUMINAIRES

- A. Metal Parts: Free from burrs, sharp corners, and edges.
- B. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- C. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during relamping and when secured in operating position. Provide for door removal for cleaning or replacing lens. Arrange to disconnect ballast when door opens.
- E. Exposed Hardware Material: Stainless steel.
- F. Lenses and Refractors: Materials as indicated. Use heat- and aging-resistant, resilient gaskets to seal and cushion lens and refractor in luminaire doors.
- G. High-Intensity-Discharge Ballasts: Comply with ANSI C82.4. Constant wattage autotransformer or regulating high-power-factor type, unless otherwise indicated.
  - 1. Ballast Fuses: One in each ungrounded supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
  - 2. Single-Lamp Ballasts: Minimum starting temperature of minus 40 deg C.
  - 3. Open-circuit operation will not reduce average life.
  - 4. High-Pressure Sodium Ballasts: Equip with a solid-state igniter/starter having an average life in pulsing mode of 10,000 hours at an igniter/starter case temperature of 90 deg C.
  - 5. Noise: Uniformly quiet operation, with a noise rating of B or better.
- H. Lamps: Comply with the standard of the ANSI C78 series that is applicable to each type of lamp. Provide luminaires with indicated lamps of designated type, characteristics, and wattage. Where a lamp is not indicated for a luminaire, provide medium wattage lamp recommended by manufacturer for luminaire.
  - 1. Metal-Halide Color Temperature and Minimum Color-Rendering Index: 3600 K and 70 CRI, unless otherwise indicated.



## 2.3 LUMINAIRE SUPPORT COMPONENTS

- A. Wind-Load Strength of Total Support Assembly: Adequate to carry support assembly plus luminaires at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of 80 mph with a gust factor of 1.3. Support assembly includes pole or other support structures, brackets, arms, appurtenances, base, and anchorage and foundation.
- B. Finish: Match finish of pole/support structure for arm, bracket, and tenon mount materials.
- C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.
  - 1. Materials: Will not cause galvanic action at contact points.
  - 2. Mountings: Correctly position luminaire to provide indicated light distribution.
  - 3. Anchor Bolts, Nuts, and Washers: Hot-dip galvanized after fabrication unless stainless-steel items are indicated.
  - 4. Anchor-Bolt Template: Plywood or steel.
- D. Pole/Support Structure Bases: Anchor type with hold-down or anchor bolts, leveling nuts, and bolt covers.
- E. Concrete for Pole Foundations: Comply with Division 3 Section "Cast-in-Place Concrete."
  - 1. Design Strength: 3000-psi, 28-day compressive strength.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Concrete Foundations: Construct according to Division 3 Section "Cast-in-Place Concrete."
  - 1. Comply with details for reinforcement and for anchor bolts, nuts, and washers. Verify anchor-bolt templates by comparing with actual pole bases furnished.
  - 2. Finish for Parts Exposed to View: Trowel and rub smooth. Comply with Division 3 Section "Cast-in-Place Concrete" for exposed finish.
- B. Install poles as follows:
  - 1. Use web fabric slings (not chain or cable) to raise and set poles.

2. Mount pole to foundation with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
  3. Secure poles level, plumb, and square.
  4. Grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space.
  5. Use a short piece of 1/2-inch- diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
- C. Luminaire Attachment: Fasten to indicated structural supports.
- D. Luminaire Attachment with Adjustable Features or Aiming: Attach luminaires and supports to allow aiming for indicated light distribution.
- E. Lamp luminaires with indicated lamps according to manufacturer's written instructions. Replace malfunctioning lamps.

### 3.2 CONNECTIONS

- A. Ground equipment.
1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Ground metal poles according to Division 16 Section "Grounding."

### 3.3 FIELD QUALITY CONTROL

- A. Inspect each installed unit for damage. Replace damaged units.
- B. Advance Notice: Give dates and times for field tests.
- C. Tests and Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source, and as follows:
1. Check excessively noisy ballasts.
- D. Prepare a written report of tests, inspections, observations and verifications indicating and interpreting results.
- E. Malfunctioning Fixtures and Components: Replace or repair, then retest. Repeat procedure until units operate properly.

**3.4 CLEANING AND ADJUSTING**

- A. Clean units after installation. Use methods and materials recommended by manufacturer.
- B. Adjust amiable luminaires and luminaires with adjustable lamp position to provide required light distributions and intensities.

**END OF SECTION 16521**

**PART 1 - SECTION 16721 - FIRE ALARM AND DETECTION****PART 2 - PART 1 - GENERAL****2.1 SCOPE AND RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specifications, apply to the work specified in this section.
- B. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the installation of the Fire Alarm and Detection System as shown on the drawings and as specified herein.
- C. The work covered by this section of the specifications to be coordinated with the related work as specified elsewhere under the project specifications.

**2.2 QUALITY ASSURANCE**

- A. Each and all items of the Fire Alarm System shall be listed as a product of a Single fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment is to be listed under UL as a single control unit.
- B. All control equipment must have transient protection devices. In addition to the UL requirement mentioned above, the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with the NEC article 760-23.
- C. Installers Qualifications: Firm with at least 5 years of successful installation experience on projects with fire alarm systems work similar to that required for this project.
  - 1. Firm with manufacturer's factory trained personnel.
  - 2. Firm with factory authorized service organization and spare parts stock.

**2.3 CODES AND STANDARDS**

- A. The equipment and installation shall comply with the current applicable provisions of the following standards:
  - 1. National Electric Code, Article 760.

2. National Fire Protection Standards:
  - a. NFPA 72 National Fire Alarm Code.
3. Applicable versions of International Building Code and International Mechanical Code.

## 2.4 SUBMITTALS

- A. Product Data: The Contractor shall submit complete documentation for the Fire Alarm System showing the Model Number, type, rating, size, style, Manufacturer's Names, and Manufacturer's Catalog Data Sheets for all items to ensure compliance with these specifications.
- B. Wiring Diagrams: Provide drawings that clearly differentiate between manufacture-installed wiring and field-installed wiring. Include point-to-point wiring diagrams for all equipment and for the entire system with all terminals and interconnections identified. Include drawings that indicate every component for both field and factory panel wiring. Wiring diagrams shall be specific to this project. Manufacturer's generic wiring diagrams are not acceptable.
- C. Floor Plans: Provide scaled floor plans of the entire building identifying the location of all fire alarm system devices and components. Indicate the routing of all conduit and all wiring between each device (i.e. - alarm initiating devices, alarm signaling appliances, control and monitoring devices) and the equipment to which each device will be connected (control panel, annunciator, remote power supply, etc.). Wiring shown on the floor plans shall identify the type of cable and quantity of each cable type in each length of conduit.
- D. NICET Certification: Submittal shall include the NICET level 2-certificate number of the Fire Alarm System Supplier's staff member that shall be responsible for overseeing the technical design and engineering functions related to this fire alarm system.
- E. Record Drawings: The Contractor shall provide one complete set of "Record Drawings" to the Owner following project completion. The drawings shall include:
  1. Routing of any conduit and all wiring from each device, (i.e. smoke detector, signaling appliance, etc. to the control panel, annunciator or remote power supply).
  2. Clearly identify each indicating appliance circuit, initiating or SLC circuit, control circuit, etc. and quantity of conductors.
  3. Device identification number.

## 2.5 EQUIPMENT MANUFACTURERS

- A. The system shall be the multiplex technology, addressable, analog system with all features as specified herein.
- B. Acceptable fire alarm system manufacturers are Notifier, Simplex and Siemens.

## 2.6 EQUIPMENT SUPPLIER QUALIFICATIONS

- A. The fire alarm equipment supplier shall have a NICET level 2 certified individual on staff responsible for overseeing the technical design and engineering functions related to the fire alarm system. The NICET level 2-certificate number must be submitted to the engineer with shop drawing submittals.
- B. The fire alarm equipment supplier shall have on staff NICET level 2 technicians supervising the final connections and programming of the system.

## PART 3 - PRODUCTS

- A. The FACP shall be an addressable type and shall contain a microprocessor based Central Processing Unit (CPU). The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent detectors, addressable modules, annunciators, and other system controlled devices. The system shall be capable of a minimum of 250 addressable points. The FACP shall have built-in synchronization for visual appliances.
- B. The panel shall be UL Listed as a Fire Alarm Control Panel per UL 864 and NFPA 72.

## 3.2 SYSTEM GENERAL OPERATIONS

- A. System Alarm Detection
  - 1. When a fire alarm condition is detected and reported by one of the system initiating devices, the following functions shall immediately occur:
    - a. The System Alarm LED shall flash.
    - b. A local signal in the control panel shall sound.
    - c. The 80-character LCD display shall indicate all information associated with the Fire Alarm condition, including: type of alarm point, its location within the protected premises, and the time and date of that activation.

- d. All system output programs assigned via control-by-event equations to be activated by the particular point in alarm shall be executed including:
  - 1) Alarm Indicating appliances.
  - 2) Control relays for general air handler shutdown.
  - 3) Control relays to recall elevators and shut down power to elevators per ASME A17.1 requirements.
  - 4) Central station outputs for connection digital communicator:
    - a) Alarm
    - b) Trouble
    - c) Supervisory
2. Elevator Hoistway - Sequence of operation:
  - a. Elevator smoke and heat detectors shall be furnished and installed to comply with all applicable NFPA and ASME/ANSI A17.1 rules and regulations for elevators. The system shall be programmed that upon the activation of a detector, Phase 1 operation, as defined by ASME/ANSI A17.1 will be initiated and return the cab to the designated level.
  - b. Upon the activation of an elevator shaft or machine room heat detector the fire alarm system shall activate a shunt trip disconnect switch to de-energize power to the elevator cab and machine room.
- B. The FACP shall contain and execute all control by event programs for specific action to be taken if an alarm condition is detected by the system. Such control by event programs shall be held in nonvolatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.
- C. All programming of the system may be achieved without special equipment or lap top computers and without interrupting the alarm monitoring functions of the Fire Alarm Control Panel. If special hardware or software is required to program the system it must included in this contract and be provided to the owner at time of delivery and the owner must be trained on the programming of the system.
- D. Program edit shall not interfere with normal operation and fire protection. If a fire condition is detected during programming operation, the system shall exit programming and perform fire protection functions as programmed.
- E. Provide a battery back-up and charging system for 24 hours of standby and 5 minutes of alarm for the entire fire alarm system.

### 3.3 SPECIAL FACP FEATURES

- A. The FACP shall provide the following features:
  - 1. Drift Compensation to extend detector accuracy over life.
  - 2. Sensitivity Test, meeting requirements of NFPA 72E.
  - 3. Maintenance Alert to warn of excessive compensation.

### 3.4 CONTROL PANEL SWITCHES

- A. Acknowledge Switch: Activation of the control panel "ACKNOWLEDGE" switch in response to new Alarms and/or Troubles shall silence the local panel piezo electric signal and change the Alarm and Trouble LEDs from flashing mode to steady ON mode. If multiple Alarm or Trouble conditions exist, depression of this switch shall advance the 80-character LCD display to the next Alarm Or Trouble condition. Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
- B. Signal Silence Switch: Activation of the "SIGNAL SILENCE" switch shall cause all programmed Alarm Indicating Appliances and relays to return to the normal condition after an alarm condition. The selection of indicating circuits and relays that are able to be silenced by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.
- C. System Reset Switch: Activation of the "SYSTEM RESET" switch shall cause all electronically latched initiating devices, appliances or software zones, as well as all associated output devices and circuits, to return to their normal condition. Holding the RESET switch shall perform a Lamp Test function.
- D. Control switches: Provide an individual switch for control of each smoke exhaust fan.

### 3.5 SLC LOOP INTERFACE

- A. The SLC Interface shall provide power to, and communicate with, all of the Intelligent /Addressable Detectors and Addressable Modules over a single pair of wires.
- B. The Loop Interface Board shall receive analog information from all Intelligent Detectors that shall be processed to determine whether normal, alarm, or trouble conditions exist for each detector. The software shall automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector.



The analog information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

- C. The detector software shall meet NFPA 72E requirements and be certified by UL as a calibrated sensitivity test instrument.

### **3.6 SYSTEM HISTORY RECORDING AND REPORTING**

- A. The History Buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.
- B. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel which shall include a backlit 80 character Liquid Crystal Display, individual, color coded system status LEDs, and an alpha-numeric keypad for the Field Programming and Control of the Fire Alarm System.

### **3.7 MAINTENANCE FUNCTIONS**

- A. Smoke Detector Sensitivity Adjust: Means shall be provided for adjusting the sensitivity of any or all analog intelligent detectors in the system from the System keypad. Sensitivity range be within the allowed UL window, and shall be a HIGH/MEDIUM/LOW selection.
- B. Automatic Detector Maintenance Alert: The Fire Alarm Control Panel shall automatically interrogate each Intelligent Smoke Detector and shall analyze the detector responses over a period of time. If any Intelligent Smoke Detector in the system responds with a reading that is below or above normal limits, then the system will enter the Trouble Mode, and the particular Detector will be annunciated on the System Display. This feature shall in no way inhibit the receipt of Alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.

### **3.8 FIELD DEVICES**

- A. Addressable Manual Pull Stations: Addressable Manual Pull Stations shall be provided to connect one addressable, supervised Manual Station to one of the Fire Alarm Control Panel Signaling Line Circuit (SLC) Loops. The Manual Station shall, on command from the Control Panel, send data to the panel representing the state of the manual switch. Manual Fire Alarm Stations shall be crush tube type with a key operated test-reset lock. Locks on manual pull stations shall be keyed the same as the lock on the Fire Alarm Control Panel.

- B. Analog Addressable Photoelectric Type Smoke Detectors: The Photoelectric-Type Smoke Detectors shall be Intelligent and Addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signaling Line Circuit Loops. The detectors shall use the photoelectric (light scattering) principle to measure products of combustion and shall, on command from the control panel, send data to the panel representing the analog level of products of combustion.
- C. The detectors shall be ceiling-mount and shall include a twist-lock base. The detectors shall provide address-setting means on the detector head using rotary decimal switch shall also store an internal identifying code that the control panel shall use to identify the type of detector. An output connection shall also be provided in the base to connect an external remote alarm LED. The detector sensitivity shall be set through the Fire Alarm Control Panel, and shall be adjustable in the field through the field programming of the system.
- D. Analog Addressable Duct Smoke Detectors: Duct Smoke Detectors shall be addressable and analog photoelectric type devices enclosed in a duct type housing and supplied with sampling tubes sized for the duct. The detectors shall be Intelligent and Addressable, and shall connect with two wires to the Fire Alarm Control Panel Signaling Line Circuit. The detector sensitivity shall be set through the Fire Alarm Control Panel, and shall be adjustable in the field through the field programming of the system. Provide sampling tubes as required.
- E. Analog Addressable Heat Detectors: The intelligent heat detectors shall be intelligent and addressable, and shall connect with two wires to one of the Fire Alarm Control Panel Signaling Line Circuit Loops. The detectors shall use an electronic sensor to measure thermal conditions caused by a fire and shall, on command from the control panel, send data to the panel representing the analog level of such thermal measurements. Detectors shall be 135 degree, fixed thermal type.
- F. The detectors shall be ceiling-mount and shall include a twist-lock base. The detectors shall provide address-setting means on the detector head using rotary decimal switch shall also store an internal identifying code that the control panel shall use to identify the type of detector.
- G. Control Module: Control Modules shall be provided to supervise and control the operation of one signal circuit or as an addressable Dry Contact (Form C) Relay. The Control Module shall provide address-setting means using rotary decimal switches and shall also store an internal identifying code that the Control Panel shall use to identify the type of device.
- H. Monitor Module: Monitor modules shall be provided to connect any N.O. dry contact device (waterflow and tamper switches) to the Fire Alarm Control

Panel Signaling Line Circuit Loop. The Monitor module shall provide address-setting means using rotary decimal switches and shall also store an internal identifying code that the Fire Alarm Control Panel shall use to identify the type of device.

- I. Signals and Strobes: Audible signals and/or audible sections of combination signals shall be electronic multi-tone units and shall not require vibrating solenoids or contacts. The audible section shall provide for a high/low setting providing different dB levels meeting the requirements of the particular room or space. Tone selection shall be 2400 Hz or low frequency mechanical sounding tone. Continuous tones or the temporal pattern based on the ANSI S3.41 Standard shall be field selectable. Set audible signals to low frequency setting and Temporal pattern for this project.
  1. The signals shall operate on 24 VDC polarized and meet UL 1971 and ADA. Mounting shall be semi-flush using standard backboxes. The visual section shall be polarized Xenon strobe in various candela ratings.
  2. There shall be FIRE lettering clearly visible on both sides of visual signals.
  3. The signal shall be able to test circuit supervision without disconnecting wires.
  4. Provide fire alarm system manufacturer's standards components as required to synchronize visual alarm indicating appliances where (2) or more are visible in a single field of view.
  5. Provide alarm signals of the following types:
    - a. Combination audible/visual appliances (horn and strobe), indoor type: Horn shall have minimum of 100 dBA @ 10 ft. output. Strobes shall have field selectable candela output (15, 30, 60, 75, 110). Device color shall be manufacturer's standard "red".
    - b. Visual appliance (strobe only): Strobes shall have field selectable candela output (15, 30, 60, 75, 110). Device color shall be manufacturer's standard "red".
    - c. Combination audible/visual appliances (horn and strobe), outdoor type: Horn shall have minimum of 85 dBA @ 10 ft. output. Strobes shall have a 75-candela rating. Device color shall be manufacturer's standard "red".
- J. Serial Connected LCD Remote Annunciators: The Annunciator shall communicate with the fire alarm panel via an EIA 485 (multi-drop) communications loop, and will be able to annunciate each and every point of the fire alarm control panel in English on the 80 character LCD display. Includes piezo sounder, time/date display field, system acknowledge switch, signal silence switch, and system reset switch. All annunciators shall exactly display all information displayed at the main fire alarm control panel.

- K. Signaling appliance remote power supplies: Shall be UL listed for fire alarm signaling and provide 6 amps of 24 VDC power. The power supply shall include 4 style Y notification appliance circuits. Provide two 7.0 amp hour batteries with each power supply. Provide quantity as required for horn/strobe signals.
- L. Central Monitoring Equipment shall be UL listed and include a commercial fire digital communicator complete with the following features:
  - 1. Meet NFPA 72C requirements for Digital Alarm Communicator Transmitter.
  - 2. Capable of seizing the telephone line at the protected premises, disconnecting an outgoing or incoming call, and preventing its use until signal transmission has been completed.
  - 3. Contain a minimum of 3 channels.
  - 4. Connected to two separate telephone lines at protected premises.
  - 5. Capable of selecting the operable line in the event of a failure on either line.
  - 6. Programmed to call a second number should the signal transmission to the first number be unsuccessful.
  - 7. Equipped with battery pack, charger, telephone jack, and dedicated 120 VAC receptacle.
  - 8. The Contractor will provide cable, connectors and installation of two CO telephone lines and interface in accordance with FCC Part 68 using a #RJ31-X jack. The Owner shall furnish two standard business lines for this purpose.
  - 9. The digital communicator shall be connected to the fire alarm system to receive and transmit alarm signals, trouble conditions and supervisory conditions.

#### PART 4 - EXECUTION

- A. The Fire Alarm Control Panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the circuit breaker panel as "FIRE ALARM CONTROL PANEL". Conduit shall enter into the Fire Alarm Control Panel backbox only at those areas of the backbox that have factory conduit knockouts.
- B. All fire alarm system wiring will be as required by the Equipment Supplier. Wire color-coding and the color shall remain the same throughout the system. In general, all initiating devices such as manual stations, thermal detectors, and ionization detectors will be installed across a common #18 AWG twisted shielded pair. The signal circuits shall require #14 AWG. All system wiring shall be plenum rated wire. The ground will be minimum one #4 AWG insulated copper.

- C. Wiring: Wiring of fire alarm system is work of this section, but is not specifically detailed on drawings. Cable above accessible ceilings shall be plenum rated and shall be routed in J-hooks and D-rings. All fire alarm in exposed or inaccessible areas, including routing in walls, shall be in conduit. Conduit stub outs above accessible ceilings shall have bushings.
- D. Complete wiring in accordance with manufacturer's requirements. Color code wiring and install per manufacturer's point-to-point wiring diagram. Determine exact number of wires for each fire area zone from number and types of devices installed. Connect each device with sufficient wiring to complete its intended operation.
- E. Where there are a number of power requiring devices such as smoke detectors, fan relays, door holders and smoke damper operators installed in a circuit, group in number so power required does not exceed 80% of manufacturer's power supply rating. Provide extra wiring, or extra power supplies required to alleviate voltage loss that will result in the device operating beyond voltage limits for which it was designed. Determine above with manufacturer's representative while equipment is being installed.
- F. Fire alarm system conduit shall be color-coded as specified in section 16195. The covers of junction boxes within the fire alarm conduit system shall be painted red.
- G. When two (2) or more visual indicating appliances are visible in a single field of view, the flash of the appliances shall be synchronized.
- H. Visual alarm indicating appliances shall be set to the candela setting noted on the drawings.
- I. Circuitry for audible/visual alarm indicating appliance power supply units are shown on the floor plans only to identify the location where power supply units to be provided shall be installed. The actual quantity of power supply units to be provided at each location shall be determined by the system vendor/installer.

#### 4.2 FIELD QUALITY CONTROL

- A. Connection and Supervision: Make connections to panel under manufacturer's supervision. Run wiring to main terminal cabinet located adjacent to main fire alarm panel. Complete connections from this cabinet to panel utilizing Manufacturer's technicians.
- B. System Test and Approval: Submit shop drawings for function and operation only.

- C. Prior to final acceptance of system, manufacturer of system shall, in presence of Contractor, Owner's Representative and Architect's/Engineer's representative, test each sensing or detection and alarm device.
- D. Submit copy of the results in duplicate after signed by Owner's Representative to Architect/Engineer and the Owner. Mount copy of inspection record in lexan-enclosed frame assembly in control panel.

#### 4.3 TRAINING

- A. Contractor shall have employed the services of an authorized representative of the manufacturer to instruct the Owners personnel fully in all phases of equipment operation upon completion of the installation. The instruction shall include 8 hours of in-house training sessions, at times and dates designated by the Owner.

#### 4.4 SERVICE FACILITIES

- A. Contractor shall make available to the Owner, a local service department of a duly authorized distributor of the equipment, which is to stock the manufacturers parts. On-the-premise maintenance is to be provided during normal working hours at no additional cost to the Owner for a period of 12 months after the date of completion of installation unless damage is caused by misuse, abuse or accident.

**END OF SECTION 16721**

**SECTION 16915 - LIGHTING CONTROL EQUIPMENT****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including The Illinois Department of Transportation Standard Specifications for Road and Bridge Construction and Supplemental Specifications and Recurring Special Provisions indicated on the Check Sheet included herein apply to this Section.

**1.2 SUMMARY**

- A. This Section includes the following types of lighting controls:
  - 1. Programmable, low-voltage lighting control systems.
  - 2. Low-voltage control system components.
  - 3. Lighting relays and relay cabinets.
- B. Related Sections: The following sections contain requirements that relate to this Section:
  - 1. Division 16 Section "Basic Electrical Materials and Methods" for general component identification and support requirements.
  - 2. Division 16 Section "Wiring Devices" for switches.
  - 3. Division 16 Section "Interior Lighting" for fixtures and ballasts.
  - 4. Division 16 Section "Exterior Lighting" for fixtures and ballasts.

**1.3 SUBMITTALS**

- A. Submit each item in this Article in accordance with Division 1, General Conditions Article: "Shop Drawings".
- B. Product Data: For lighting control equipment and systems components, including dimensions and data on features and components. Include wiring diagrams and elevation views of front panels of control and indicating devices. Include data on ratings.
  - 1. Operational documentation for software.
- C. Shop Drawings: Detailing assemblies of standard components, custom assembled for specific application on Project. Indicate dimensions, weights, arrangement of components, and clearance and access requirements.

- D. Wiring Diagrams: Detailing specific wiring requirements tailored to the requirements for this Project and differentiating between factory-installed and field-installed wiring.
- E. Field Test Reports: Indicating and interpreting test results specified in Part 3 of this Section.
- F. Operation and Maintenance Data: For lighting control equipment and systems components to include in the "Operating and Maintenance Manual" specified in Division 1 Section "Project Closeout."

#### 1.4 QUALITY ASSURANCE

- A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.
- B. Comply with FCC Regulations of Part 15, Subpart J for Class A.
- C. Listing and Labeling: Provide products specified in this Section that are UL listed and labeled.

#### 1.5 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Warranty Period: 2 years from date of Substantial Completion. Submit a written warranty signed by manufacturer and Installer agreeing to replace programmable lighting control system components that fail in materials or workmanship within the specified warranty period.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Product numbers noted in this specification are those of products manufactured by the Watt Stopper Company. Subject to compliance with requirements, provide products by one of the following manufacturer's:
  - 1. Programmable, Low-Voltage Lighting Control Systems:



- a. GE Lighting Controls.
  - b. Microlite Corporation.
  - c. Watt Stopper
  - d. Siemens Energy & Automation
2. Relays:
- a. Eaton Corporation, Cutler-Hammer Products.
  - b. GE Lighting Controls.
  - c. Square D Co.
  - d. Watt Stopper

## 2.2 LIGHTING CONTROL EQUIPMENT, GENERAL

- A. Include line-voltage surge protection in all solid-state equipment. Comply with UL 1449 and ANSI C62.41.
- B. Load Compatibility: Components compatible with each other and with controlled loads.

## 2.3 PROGRAMMABLE, LOW-VOLTAGE LIGHTING CONTROL SYSTEMS

- A. General: Conform to UL 916.
- B. System Control Module Description: Programmable, microprocessor-based control unit mounted in pre-assembled modular relay panel. Low-voltage, controlled, latching-type, single-pole lighting circuit relays are prime output circuit devices. Where indicated, a limited number of digital or analog, low-voltage control circuit outputs are supported by control unit and circuit boards associated with each relay. Control unit receives inputs from indicated sensors and other sources. Line-voltage components and wiring are separated from low-voltage components and wiring by barriers. Modules include the following features:
  1. System Memory: Nonvolatile. Reboots program and resets time automatically without errors after power outages up to 90 days' duration.
  2. Automatic Adjustment: System automatically adjusts for leap year and daylight savings time and provides weekly routine and annual holiday scheduling.
  3. Astronomic Control: Automatic adjustment of dawn and dusk switching.
  4. Local Override Capability: Manual, low-voltage control devices override programmed shutdown of lighting and other programmed control for intervals that may be programmed as to duration.
  5. Automatic battery back-up provides power to maintain program and system clock operation for 90 days' minimum duration when power is off.

6. Flick Warning: Programmable momentary turnoff of lights warns that programmed shutoff will occur in 5 minutes. Warning is repeated 5 minutes before end of programmed override period.
7. Diagnostics: When system operates improperly, software initiates factory-programmed diagnosis of failure and displays messages identifying problem and possible causes.
8. System shall be a Watt Stopper "Smartwired Switching System", including but not limited to, a HIN48SS panel interior, HPSM115/277 power supply, HCVR48SL surface cover, HTUB48 surface mounted enclosure, HCLK8SS network clock/programmer, HDLS1SS dataline switch, HPCP8SS photocontrol package.

## 2.4 RELAYS

- A. Comply with NEMA ICS 2.
- B. Description: Devices are electrically operated and mechanically held. Number of poles and ratings are as indicated. Coordinate rating of each unit with type of load served, including tungsten filament and inductive-type loads.
- C. Modular Relays: Split-coil, momentary-pulsed type, knockout mounting.
  1. Low-Voltage Leads: 5-pin plug connector.
  2. Pilot Contacts: Single pole.
  3. Rated Capacity: 20 A, 125 VAC and 20A, 277 VAC for tungsten filaments; 20 A, 277 VAC for ballasts.
  4. Endurance: 50,000 cycles at rated capacity.
- D. Modular Relay Cabinets: Steel cabinets, pre-assembled with modular single-pole relays, transformer power supplies, and associated components as required for all functions as specified herein and as indicated on the drawings.
  1. Barriers separate low-voltage and line-voltage components.
  2. Cover: Hinged, lockable type.
  3. Directory: Mounted on back of door. Identifies relays and loads controlled.

## 2.5 PHOTOELECTRIC CONTROL

- A. Photoelectric Control Package: Watt Stopper HPCP8SS photocontrol package module with external photo sensor.

## 2.6 MANUAL SWITCHES AND PLATES

- A. Switches: Watt Stopper HDLS1SS-2. Color shall be ivory.

- B. Switching Modules: Watt Stopper HUSM8SS.

## 2.7 LOW-VOLTAGE WIRING

- A. Low-Voltage Control Cable: Multiple conductor, color-coded, No. 18 AWG copper.
  - 1. Sheath: Polyvinyl chloride (PVC), except in plenum-type spaces. In plenum-type spaces, use sheath listed for such use.
  - 2. Switch Circuits: 4 conductors, except as otherwise indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install equipment according to manufacturers' written instructions. Install top of relay cabinet 54" above finished floor.
- B. Mount control equipment according to manufacturers' instructions and Division 16 Section "Basic Electrical Materials and Methods."

### 3.2 CONTROL WIRING INSTALLATION

- A. Wiring Method: Install all wiring in raceway as specified in Division 16 Section "Raceways and Boxes."
- B. Bundle, train, and support wiring in enclosures.
- C. Grounding: Ground equipment. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

### 3.3 IDENTIFICATION

- A. Identify components and power and control wiring according to Division 16 Section "Basic Electrical Materials and Methods."
- B. Label each system control module with a unique designation.
- C. Complete relay directories to identify the specific load or area of the facility being served by each relay. Relay directories shall be typewritten. Utilize final, Owner assigned room names and numbers when completing relay directories.

- D. Provide an engraved nameplate on the exterior of the relay cabinet. Nameplate shall be as specified in specification section 16195.

### 3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide services of a factory-authorized service representative to test, adjust, and program lighting control systems.
- B. Reports: Prepare written reports of tests and observations. Report defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
- C. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible organization and person.
- D. Schedule visual and mechanical inspections and electrical tests with at least 7 days' advance notice.
- E. Visual and Operational Inspections: Include the following inspections:
  - 1. Inspect control components for defects and physical damage, UL labeling, and nameplate compliance with current Contract Documents.
  - 2. Check tightness of electrical connections with torque wrench. Use manufacturer's recommended torque values.
  - 3. Exercise and perform operational tests on mechanical parts and operable devices according to manufacturer's instructions for routine functional operation.
- F. Electrical Tests: Use particular caution when testing devices containing solid-state components. Perform the following tests according to manufacturer's instructions:
  - 1. Continuity tests of circuits.
  - 2. Operational Tests: Set and operate controls to demonstrate controls in a methodical sequence that cues and reproduces actual operating functions. Include testing of ambient-light, programmable, and occupancy controls under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
- G. Correct deficiencies disclosed by inspections and tests, make necessary adjustments, and retest deficient items. Verify that specified requirements are met.

**3.5 ADJUSTING AND CLEANING**

- A. Repair scratches and mars of finish to match original finish. Clean equipment and devices internally and externally using methods and materials recommended by manufacturers.

**3.6 DEMONSTRATION**

- A. Training: Provide services of a factory-authorized service representative to demonstrate programmable lighting control system and to train Owner's maintenance personnel.
- B. Train Owner's personnel to operate, service, maintain, adjust, and program equipment and system components. Allow at least 8 hours to conduct training. Schedule training with at least 7 days' advance notice to the Owner. Use final approved operation and maintenance manual as a training aid throughout training. Training shall occur at the project site. Provide "classroom type" training and hands-on exercises utilizing installed components.

**END OF SECTION 16915**

**REQUIRED CONTRACT PROVISIONS  
FEDERAL-AID CONSTRUCTION CONTRACTS**

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**ATTACHMENTS**

- A. Employment Preference for Appalachian Contracts  
(included in Appalachian contracts only)

**I. GENERAL**

1. These contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

2. Except as otherwise provided for in each section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions, and further require their inclusion in any lower tier subcontract or purchase order that may in turn be made. The Required Contract Provisions shall not be incorporated by reference in any case. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with these Required Contract Provisions.

3. A breach of any of the stipulations contained in these Required Contract Provisions shall be sufficient grounds for termination of the contract.

4. A breach of the following clauses of the Required Contract Provisions may also be grounds for debarment as provided in 29 CFR 5.12:

- Section I, paragraph 2;
- Section IV, paragraphs 1, 2, 3, 4 and 7;
- Section V, paragraphs 1 and 2a through 2g.

5. Disputes arising out of the labor standards provisions of Section IV (except paragraph 5) and Section V of these Required Contract Provisions shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the U.S. Department of Labor (DOL) as set forth in 29 CFR 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the DOL, or the contractor's employees or their representatives.

6. Selection of Labor: During the performance of this contract, the contractor shall not:

- a. Discriminate against labor from any other State, possession, or territory of the United States (except for employment preference for Appalachian contracts, when applicable, as specified in Attachment A), or
- b. Employ convict labor for any purpose within the limits of the project unless it is labor performed by convicts who are on parole, supervised release, or probation.

**II. NONDISCRIMINATION**

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630 and 41 CFR 60 (and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The Equal Opportunity Construction Contract Specifications set forth under 41 CFR 60-4.3 and the provisions of the American Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the State highway agency (SHA) and the Federal Government in carrying out EEO obligations and in their review of his/her activities under the contract.

b. The contractor will accept as his operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, preapprenticeship, and/or on-the-job-training."

2. EEO Officer: The contractor will designate and make known to the SHA contracting officers an EEO Officer who will have the responsibility for an must be capable of effectively administering and promoting an active contractor program of EEO and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above

agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minority group employees.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minority groups in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employees referral sources likely to yield qualified minority group applicants. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish which such identified sources procedures whereby minority group applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, he is expected to observe the provisions of that agreement to the extent that the system permits the contractor's compliance with EEO contract provisions. (The DOL has held that where implementation of such agreements have the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Executive Order 11246, as amended.)

c. The contractor will encourage his present employees to refer minority group applicants for employment. Information and procedures with regard to referring minority group applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any

evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with his obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of his avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minority group and women employees, and applicants for employment.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision.

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of minority group and women employees and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use his/her best efforts to obtain the cooperation of such unions to increase opportunities for minority groups and women within the unions, and to effect referrals by such unions of minority and female employees. Actions by the contractor either directly or through a contractor's association acting as agent will include the procedures set forth below:

a. The contractor will use best efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minority group members and women for membership in the unions and increasing the skills of minority group employees and women so that they may qualify for higher paying employment.

b. The contractor will use best efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to

the SHA and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of minority and women referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or quailifiable minority group persons and women. (The DOL has held that it shall be no excuse that the union with which the contractor has a collective bargaining agreement providing for exclusive referral failed to refer minority employees.) In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the SHA.

8. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment.

a. The contractor shall notify all potential subcontractors and suppliers of his/her EEO obligations under this contract.

b. Disadvantaged business enterprises (DBE), as defined in 49 CFR 23, shall have equal opportunity to compete for and perform subcontracts which the contractor enters into pursuant to this contract. The contractor will use his best efforts to solicit bids from and to utilize DBE subcontractors or subcontractors with meaningful minority group and female representation among their employees. Contractors shall obtain lists of DBE construction firms from SHA personnel.

c. The contractor will use his best efforts to ensure subcontractor compliance with their EEO obligations.

9. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following completion of the contract work and shall be available at reasonable times and places for inspection by authorized representatives of the SHA and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women;

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minority and female employees; and

(4) The progress and efforts being made in securing the services of DBE subcontractors or subcontractors with meaningful minority and female representation among their employees.

b. The contractors will submit an annual report to the SHA each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data.

### III. NONSEGREGATED FACILITIES

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more.)

a. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

b. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

c. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

### IV. PAYMENT OF PREDETERMINED MINIMUM WAGE

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural minor collectors, which are exempt.)

#### 1. General:

a. All mechanics and laborers employed or working upon the site of the work will be paid unconditionally and not less often than once a week and without subsequent deduction or rebate on any account [except such payroll deductions as are permitted by regulations (29 CFR 3) issued by the Secretary of Labor under the Copeland Act (40 U.S.C. 276c)] the full amounts of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment. The payment shall be computed at wage rates not less than those contained in the wage determination of the Secretary of Labor (hereinafter "the wage determination") which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the



contractor or its subcontractors and such laborers and mechanics. The wage determination (including any additional classifications and wage rates conformed under paragraph 2 of this Section IV and the DOL poster (WH-1321) or Form FHWA-1495) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. For the purpose of this Section, contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act (40 U.S.C. 276a) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of Section IV, paragraph 3b, hereof. Also, for the purpose of this Section, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in paragraphs 4 and 5 of this Section IV.

b. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein, provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

c. All rulings and interpretations of the Davis-Bacon Act and related acts contained in 29 CFR 1, 3, and 5 are herein incorporated by reference in this contract.

## 2. Classification:

a. The SHA contracting officer shall require that any class of laborers or mechanics employed under the contract, which is not listed in the wage determination, shall be classified in conformance with the wage determination.

b. The contracting officer shall approve an additional classification, wage rate and fringe benefits only when the following criteria have been met:

(1) the work to be performed by the additional classification requested is not performed by a classification in the wage determination;

(2) the additional classification is utilized in the area by the construction industry;

(3) the proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) with respect to helpers, when such a classification prevails in the area in which the work is performed.

c. If the contractor or subcontractors, as appropriate, the laborers and mechanics (if known) to be employed in the additional classification or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the DOL, Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, D.C. 20210. The Wage and Hour Administrator, or an authorized representative, will approve, modify, or

disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

d. In the event the contractor or subcontractors, as appropriate, the laborers or mechanics to be employed in the additional classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the question, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. Said Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

e. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 2c or 2d of this Section IV shall be paid to all workers performing work in the additional classification from the first day on which work is performed in the classification.

## 3. Payment of Fringe Benefits:

a. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor or subcontractors, as appropriate, shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly case equivalent thereof.

b. If the contractor or subcontractor, as appropriate, does not make payments to a trustee or other third person, he/she may consider as a part of the wages of any laborer or mechanic the amount of any cost reasonably anticipated in providing bona fide fringe benefits under a plan or program, provided that the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

## 4. Apprentices and Trainees (Programs of the U.S. DOL) and Helpers:

### a. Apprentices:

(1) Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the DOL, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau, or if a person is employed in his/her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State apprenticeship agency (where appropriate) to be eligible for probationary employment as an apprentice.

(2) The allowable ratio of apprentices to journeyman-level employees on the job site in any craft classification shall not

listed on the wage determination unless the Administrator of the

be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate listed in the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor or subcontractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman-level hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

(3) Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator for the Wage and Hour Division determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

(4) In the event the Bureau of Apprenticeship and Training, or a State apprenticeship agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor or subcontractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the comparable work performed by regular employees until an acceptable program is approved.

b. Trainees:

(1) Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the DOL, Employment and Training Administration.

(2) The ratio of trainees to journeyman-level employees on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(3) Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress, expressed as a percentage of the journeyman-level hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits

Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman-level wage rate on the wage determination which provides for less than full fringe benefits for apprentices, in which cases such trainees shall receive the same fringe benefits as apprentices.

(4) In the event the Employment and Training Administration withdraws approval of a training program, the contractor or subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Helpers:

Helpers will be permitted to work on a project if the helper classification is specified and defined on the applicable wage determination or is approved pursuant to the conformance procedure set forth in Section IV. 2. Any worker listed on a payroll at a helper wage rate, who is not a helper under a approved definition, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed.

5. Apprentices and Trainees (Programs of the U.S. DOT):

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

6. Withholding:

The SHA shall upon its own action or upon written request of an authorized representative of the DOL withhold, or cause to be withheld, from the contractor or subcontractor under this contract or any other Federal contract with the same prime contractor or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements which is held by the same prime contractor, as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainee's and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the SHA contracting officer may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

7. Overtime Requirements:

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers, mechanics, watchmen, or guards (including apprentices, trainees, and helpers described in paragraphs 4 and 5 above) shall require or permit any laborer, mechanic, watchman, or guard in any workweek in which he/she is employed on such work, to work in excess of 40 hours in such workweek unless such laborer, mechanic, watchman, or guard receives compensation at a rate not less than one-and-one-half times his/her basic rate of pay for all hours worked in excess of 40 hours in such workweek.

## 8. Violation:

Liability for Unpaid Wages; Liquidated Damages: In the event of any violation of the clause set forth in paragraph 7 above, the contractor and any subcontractor responsible thereof shall be liable to the affected employee for his/her unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer, mechanic, watchman, or guard employed in violation of the clause set forth in paragraph 7, in the sum of \$10 for each calendar day on which such employee was required or permitted to work in excess of the standard work week of 40 hours without payment of the overtime wages required by the clause set forth in paragraph 7.

## 9. Withholding for Unpaid Wages and Liquidated Damages:

The SHA shall; upon its own action or upon written request of any authorized representative of the DOL withhold, or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 8 above.

## V. STATEMENTS AND PAYROLLS

(Applicable to all Federal-aid construction contracts exceeding \$2,000 and to all related subcontracts, except for projects located on roadways classified as local roads or rural collectors, which are exempt.)

### 1. Compliance with Copeland Regulations (29 CFR 3):

The contractor shall comply with the Copeland Regulations of the Secretary of Labor which are herein incorporated by reference.

### 2. Payrolls and Payroll Records:

a. Payrolls and basic records relating thereto shall be maintained by the contractor and each subcontractor during the course of the work and preserved for a period of 3 years from the date of completion of the contract for all laborers, mechanics, apprentices, trainees, watchmen, helpers, and guards working at the site of the work.

b. The payroll records shall contain the name, social security number, and address of each such employee; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalent thereof the types described in Section 1(b)(2)(B) of the Davis Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. In addition, for Appalachian contracts, the payroll records shall contain a notation indicating whether the employee does, or does not, normally reside in the labor area as defined in Attachment A, paragraph 1. Whenever the Secretary of Labor, pursuant to Section IV, paragraph 3b, has found that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan

or program described in Section 1(b)(2)(B) of the Davis Bacon Act, the contractor and each subcontractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, that the plan or program has been communicated in writing to the laborers or mechanics affected, and show the cost anticipated or the actual cost incurred in providing benefits. Contractors or subcontractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprentices and trainees, and ratios and wage rates prescribed in the applicable programs.

c. Each contractor and subcontractor shall furnish, each week in which any contract work is performed, to the SHA resident engineer a payroll of wages paid each of its employees (including apprentices trainees, and helpers, described in Section IV, paragraphs 4 and 5, and watchmen and guards engaged on work during the preceding weekly payroll period).

The payroll submitted shall set out accurately and completely all of the information required to be maintained under paragraph 2b of this Section V.

This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal stock number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

d. Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his/her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) that the payroll for the payroll period contains the information required to be maintained under paragraph 2b of this Section V and that such information is correct and complete;

(2) that such laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR 3;

(3) that each laborer or mechanic has been paid not less than the applicable wage rate and fringe benefits or cash equivalent for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

e. The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 2d of this Section V.

f. The falsification of any of the above certifications may subject the contractor to civil or criminal prosecution under 18 U.S. C. 1001 and 31 U.S.C. 231.

g. The contractor or subcontractor shall make the records required under paragraph 2b of this Section V available for

inspection, copying, or transcription by authorized representatives of the SHA, the FHWA, or the DOL, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the SHA, the FHWA, the DOL, or all may, after written notice to the contractor, sponsor, applicant, or owner, take such actions as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

## **VI. RECORD OF MATERIALS, SUPPLIES, AND LABOR**

1. On all federal-aid contracts on the national highway system, except those which provide solely for the installation of protective devices at railroad grade crossings, those which are constructed on a force account or direct labor basis, highway beautification contracts, and contracts for which the total final construction cost for roadway and bridge is less than \$1,000,000 (23 CFR 635) the contractor shall:

- a. Become familiar with the list of specific materials and supplies contained in Form FHWA-47, "Statement of Materials and Labor Used by Contractor of Highway Construction Involving Federal Funds," prior to the commencement of work under this contract.
- b. Maintain a record of the total cost of all materials and supplies purchased for and incorporated in the work, and also of the quantities of those specific materials and supplies listed on Form FHWA-47, and in the units shown on Form FHWA-47.
- c. Furnish, upon the completion of the contract, to the SHA resident engineer on Form FHWA-47 together with the data required in paragraph 1b relative to materials and supplies, a final labor summary of all contract work indicating the total hours worked and the total amount earned.

2. At the prime contractor's option, either a single report covering all contract work or separate reports for the contractor and for each subcontract shall be submitted.

## **VII. SUBLETTING OR ASSIGNING THE CONTRACT**

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the State. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractors' own organization (23 CFR 635).

- a. "Its own organization" shall be construed to include only workers employed and paid directly by the prime contractor and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor, assignee, or agent of the prime contractor.
- b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract as a

whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph 1 of Section VII is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the SHA contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the SHA contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract.

Written consent will be given only after the SHA has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

## **VIII. SAFETY: ACCIDENT PREVENTION**

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the SHA contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

## **IX. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS**

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification,

distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, the following notice shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

**NOTICE TO ALL PERSONNEL ENGAGED ON FEDERAL-AID HIGHWAY PROJECTS**

18 U.S.C. 1020 reads as follows:

*“Whoever, being an officer, agent or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or*

*Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or*

*Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;*

*Shall be fined not more than \$10,000 or imprisoned not more than 5 years or both.”*

**X. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT**

(Applicable to all Federal-aid construction contracts and to all related subcontracts of \$100,000 or more).

By submission of this bid or the execution of this contract, or subcontract, as appropriate, the bidder, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any facility that is or will be utilized in the performance of this contract, unless such contract is exempt under the Clean Air Act, as amended (42 U.S.C. 1857 et seq., as amended by Pub.L. 91-604), and under the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251 et seq., as amended by Pub.L. 92-500), Executive Order 11738, and regulations in implementation thereof (40 CFR 15) is not listed, on the date of contract award, on the U.S. Environmental Protection Agency (EPA) List of Violating Facilities pursuant to 40 CFR 15.20.

2. That the firm agrees to comply and remain in compliance with all the requirements of Section 114 of the Clean Air Act and Section 308 of the Federal Water Pollution Control Act and all regulations and guidelines listed thereunder.

3. That the firm shall promptly notify the SHA of the receipt of

any communication from the Director, Office of Federal Activities, EPA indicating that a facility that is or will be utilized for the contract is under consideration to be listed on the EPA List of Violating Facilities.

4. That the firm agrees to include or cause to be included the requirements of paragraph 1 through 4 of this Section X in every nonexempt subcontract, and further agrees to take such action as the government may direct as a means of enforcing such requirements.

**XI. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION**

1. Instructions for Certification - Primary Covered Transactions:

(Applicable to all Federal-aid contracts - 49 CFR 29)

a. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.

d. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “lower tier covered transaction,” “participant,” “person,” “primary covered transaction,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is submitted for assistance in obtaining a copy of those regulations.

f. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.

g. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled

“Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,” provided by the department or agency entering into this covered transaction, without modification in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the nonprocurement portion of the “Lists of Parties Excluded from Federal Procurement or Nonprocurement Programs” (Nonprocurement List) which is compiled by the General Services Administration.

i. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph f of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

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### **Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Primary Covered Transactions**

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:

- a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
- b. Have not within a 3-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
- c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph 1b of this certification; and
- d. Have not within a 3-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

### **2. Instructions for Certification - Lower Tier Covered Transactions:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions of \$25,000 or more - 49 CFR 29)

- a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.
- b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
- c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.
- d. The terms “covered transaction,” “debarred,” “suspended,” “ineligible,” “primary covered transaction,” “participant,” “person,” “principal,” “proposal,” and “voluntarily excluded,” as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
- e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
- f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled “Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction,” without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
- g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List.
- h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealing.
- i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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**Certification Regarding Debarment, Suspension, Ineligibility And Voluntary Exclusion-Lower Tier Covered Transactions:**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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**XII. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING**

(Applicable to all Federal-aid construction contracts and to all related subcontracts which exceed \$100,000 - 49 CFR 20)

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

3. The prospective participant also agrees by submitting his or her bid or proposal that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.

**MINIMUM WAGES FOR FEDERAL AND FEDERALLY  
ASSISTED CONSTRUCTION CONTRACTS**

This project is funded, in part, with Federal-aid funds and, as such, is subject to the provisions of the Davis-Bacon Act of March 3, 1931, as amended (46 Sta. 1494, as amended, 40 U.S.C. 276a) and of other Federal statutes referred to in a 29 CFR Part 1, Appendix A, as well as such additional statutes as may from time to time be enacted containing provisions for the payment of wages determined to be prevailing by the Secretary of Labor in accordance with the Davis-Bacon Act and pursuant to the provisions of 29 CFR Part 1. The prevailing rates and fringe benefits shown in the General Wage Determination Decisions issued by the U.S. Department of Labor shall, in accordance with the provisions of the foregoing statutes, constitute the minimum wages payable on Federal and federally assisted construction projects to laborers and mechanics of the specified classes engaged on contract work of the character and in the localities described therein.

General Wage Determination Decisions, modifications and supersedes decisions thereto are to be used in accordance with the provisions of 29 CFR Parts 1 and 5. Accordingly, the applicable decision, together with any modifications issued, must be made a part of every contract for performance of the described work within the geographic area indicated as required by an applicable DBRA Federal prevailing wage law and 29 CFR Part 5. The wage rates and fringe benefits contained in the General Wage Determination Decision shall be the minimum paid by contractors and subcontractors to laborers and mechanics.

**NOTICE**

The most current **General Wage Determination Decisions** (wage rates) are available on the IDOT web site. They are located on the Letting and Bidding page at <http://www.dot.state.il.us/desenv/delett.html>.

In addition, ten (10) days prior to the letting, the applicable Federal wage rates will be e-mailed to subscribers. It is recommended that all contractors subscribe to the Federal Wage Rates List or the Contractor's Packet through IDOT's subscription service.

PLEASE NOTE: if you have already subscribed to the Contractor's Packet you will automatically receive the Federal Wage Rates.

The instructions for subscribing are at <http://www.dot.state.il.us/desenv/subsc.html>.

If you have any questions concerning the wage rates, please contact IDOT's Chief Contract Official at 217-782-7806.