

THE STATE OF TEXAS §

COUNTY OF WEBB §

AGREEMENT

This AGREEMENT is made by and between Webb County, a political subdivision of the State of Texas (hereinafter referred to as "County"), 1000 Houston Street, Laredo, Texas 78040, and Cognituv, LLC, (hereinafter referred to as "Contractor"), 5004 Bee Creek Road, Suite #320, Spicewood, TX 78669.

Recitals

Whereas, Webb County seeks to enter into a Construction Project involving installation of UV-C lights within AC equipment and ductwork for noted Webb County building locations as set out in the attached Exhibit "A" and to provide all materials and labor associated with a complete operational installation of UV-V lights designed to disinfect and sanitize air and surfaces within the HVAC system, reducing the risk of airborne infectious diseases; and,

Whereas, Contractor represents that it is qualified and capable of providing the materials, labor and performing the services called for in this agreement and is willing to perform these services; and

Whereas, Webb County desires that Contractor provide the materials and the services as set forth herein;

Now, Therefore, Webb County and Contractor, in consideration of their mutual promises and benefits, do mutually agree as follows:

Section 1. Scope of Services.

Contractor agrees to furnish all supervision, labor, materials, supplies, equipment, and subcontracting necessary and required for **installation of UV-C lights within AC equipment and ductwork for noted Webb County building locations as set out in the attached Exhibit "A" and to provide all materials and labor associated with a complete operational installation of UV-V lights designed to disinfect and sanitize air and surfaces within the HVAC system, reducing the risk of airborne infectious diseases** The services, and conditions/requirements under which services are to be provided are more particularly described in Exhibit B, "General Conditions and Specifications" attached hereto and incorporated herein by reference as if set forth in full for all intents and purposes. Further, this Agreement is subject to the provisions set out in Request for Proposal (RFP) **2025-005 ARPA Project No. 11-Webb County UV-C Lights Project**, but only to the extent that they do not conflict with this Agreement, and Response to said proposal submitted by Contractor and which are incorporated by reference as set forth in full for all intents and purposes.

Section 2. Compensation.

For and in consideration of the material's provided and services rendered by Contractor, the County shall pay Contractor **ONE MILLION SEVENTY-SEVEN THOUSAND SIX HUNDRED SIX DOLLARS AND TWENTY-FIVE CENTS DOLLARS (\$1,077,606.25)**. Said payment is intended to compensate Contractor for all time, materials, and expenses. All equipment, tools and supplies necessary in the provision of services hereunder shall be supplied by Contractor at its own expense. Notwithstanding the above, the County shall have no obligation to pay for any work, services, or expenditures hereunder which have been rendered or incurred without prior authorization as described in Section 3. Furthermore, in no event will the County be obligated to compensate Contractor more than **\$1,077,606.25** or shall Contractor be required to provide services, which would entitle Contractor to compensation in excess of **\$1,077,606.25** such amount is subject to Section 10, "Limit of Appropriation".

Section 3. Authorization and Supervision.

The County representative, as assigned by Webb County on a project-by-project basis, will be the contact person for Contractor. The County Representative for this Project is **Guillermo Cuellar, P.E., Webb County Engineering Department**. Prior to the commencement of work under this agreement; Contractor shall obtain authorization to commence work hereunder from the County Representative. Contractor shall provide competent, full-time supervision of the work at all times during the term of this Agreement.

Section 4. Method of Payment.

As required by County Representative, on or about the last day of each month during the term of this Agreement, Contractor shall submit an itemized statement to the County Representative, setting forth in detail the services provided hereunder and the compensation claimed therefor. The statement shall be in a form acceptable to the County Auditor and shall include such other details as may be requested by the County Auditor for verification purposes. The County Representative will review the statement and approve it with such modifications as may be deemed appropriate. Thereafter the County Representative shall forward the statement with any modifications to the County Auditor for payment. **For each approved statement, County shall withhold Five Percent (5%) as retainage from the payment amount owed the Contractor.** The County shall pay the statement amount approved by the County Representative less retainage within thirty (30) days after the County Auditor approves same.

Section 5. Term and Liquidated Damages.

This Agreement becomes effective when signed by the last party whose signing makes the Agreement fully executed and, unless terminated sooner in accordance with the provisions hereof. Contractor shall not commence Work on the Project until receiving a "Notice to Proceed" from the County's Representative. Contractor shall achieve Substantial Completion of the project within **one hundred twenty (120)** calendar days of the date set out in the Notice to Proceed and Final Completion Date shall be thirty calendar days after the date of Substantial Completion. In the event Contractor does not complete all work by the Final Completion Date, Contractor shall pay liquidated damages to County in the amount of Five Hundred Dollars (\$500.00) per day until the Project is completed. County and Contractor agree

that liquidated damages as described in this Agreement are a genuine estimate of the County's sole remedy for such delay. Delay caused by Force Majeure events or by actions of the County shall not result in the payment of liquidated damages.

Section 6. Compliance.

Contractor agrees to perform the services hereunder in in a good and workmanlike manner and in accordance with generally accepted standards applicable thereto and shall comply with all applicable state, federal, and local laws, ordinances, rules and regulations relating to the services performed hereunder. Contractor shall not access any information which they are not authorized to receive, and under no circumstances shall Contractor at any time, during the term of this Agreement or thereafter, release or divulge any confidential material, information or documents received during the performance of their services hereunder without the express written consent of the County, nor shall Contractor copy, recreate or use any such confidential information or documents other than for the performance of this agreement. Contractor shall obtain, at its own expense, all permits, certificates, and licenses as may be required in the performance of the services required hereunder.

Section 7. Indemnity.

CONTRACTOR SHALL DEFEND, INDEMNIFY, AND SAVE WHOLE AND HARMLESS THE COUNTY AND ALL ITS OFFICERS, AGENTS, AND EMPLOYEES FROM AND AGAINST ALL SUITS, ACTIONS, OR CLAIMS OF ANY CHARACTER, NAME, AND DESCRIPTION BROUGHT FOR OR ON ACCOUNT OF ANY INJURIES OR DAMAGES, INCLUDING DEATH, RECEIVED OR SUSTAINED BY ANY PERSON OR PROPERTY ON ACCOUNT OF, ARISING OUT OF, OR IN CONNECTION WITH, ANY NEGLIGENT ACT OR OMISSION OF CONTRACTOR OR ANY AGENT, EMPLOYEE, SUBCONTRACTOR OR SUPPLIER OF CONTRACTOR IN THE EXECUTION OR PERFORMANCE OF THIS AGREEMENT. CONTRACTOR SHALL ALSO DEFEND AND INDEMNIFY THE COUNTY AGAINST CLAIMS BY ANY SUBCONTRACTOR, SUPPLIER, LABORER, MATERIALMAN, OR MECHANIC FOR PAYMENT FOR WORK OR MATERIALS PROVIDED ON BEHALF OF CONTRACTOR IN THE PERFORMANCE OF THE SERVICES HEREUNDER; AND ALL SUCH CLAIMANTS SHALL LOOK SOLELY TO CONTRACTOR AND NOT TO THE COUNTY FOR SATISFACTION OF ALL SUCH CLAIMS.

Section 8. Assignment.

Other than as contemplated in Exhibit "A", Contractor shall not sell, assign, transfer or convey this Agreement, in whole or in part, without the prior written consent of the County. As a condition of such consent, Contractor shall remain liable for completion of the services in the event of default by the successor contractor or assignee.

Section 9. Insurance.

Prior to the beginning of any work hereunder, Contractor shall provide proof and maintain the

following insurance policies:

Commercial General Liability insurance at minimum combined single limits of \$1,000,000 per-occurrence and \$2,000,000 general aggregate for bodily injury and property damage, which coverage shall include products/completed operations (\$1,000,000 products/ completed operations aggregate), and XCU (Explosion, Collapse, Underground) hazards. Coverage for products/completed operations must be maintained for at least two (2) years after the construction work has been completed. Coverage must be amended to provide for an each-project aggregate limit of insurance. An alternative would be to have separate limits for all lines of General Liability coverage for each project.

Workers Compensation insurance at statutory limits, including Employers Liability coverage a minimum limits of \$1,000,000 each-occurrence each accident/\$1,000,000 by disease each-occurrence/\$1,000,000 by disease aggregate.

Commercial Automobile Liability insurance at minimum combined single limits of \$1,000,000 per-occurrence for bodily injury and property damage, including owned, non-owned, and hired car coverage.

Builders Risk coverage as follows:

All Risk Builders Risk insurance, including collapse coverage, is required on a completed value form if the contract is for the construction of a structure or building.

The Builders Risk policy must provide transit and off-premises coverage if the contract with the builder makes Webb County responsible for materials. The deductible shall not exceed \$5,000.

A payment and performance bond must be maintained in the amount of the contract cost.

Umbrella Liability at minimum limits of NONE each-occurrence/ NONE aggregate with respect to primary Commercial General Liability, Automobile Liability, and Employers Liability policies.

Any Subcontractor(s) hired by the Contractor shall maintain insurance coverage equal to that required of the Contractor. It is the responsibility of the Contractor to assure compliance with this provision. Webb County accepts no responsibility arising from the conduct, or lack of conduct, of the Subcontractor.

A Comprehensive General Liability insurance form may be used in lieu of a Commercial General Liability insurance form. In this event, coverage must be written on an occurrence basis, at limits of \$1,000,000 each-occurrence, combined single limit, and coverage must include a broad form Comprehensive General Liability Endorsement, products/completed operations, XCU hazards, and contractual liability.

With reference to the foregoing insurance requirement, Contractor shall specifically endorse applicable insurance policies as follows:

Webb County shall be named as an additional insured with respect to General Liability and Automobile Liability.

All liability policies shall contain no cross-liability exclusions or insured versus insured restrictions.

A waiver of subrogation in favor of Webb County shall be contained in the Workers Compensation, Builders Risk, and all liability policies.

All insurance policies shall be endorsed to require the insurer to immediately notify Webb County of any material change in the insurance coverage.

All insurance policies shall be endorsed to the effect that Webb County will receive at least sixty(60)-days' notice prior to cancellation or non-renewal of the insurance.

All insurance policies, which name Webb County as an additional insured, must be endorsed to read as primary coverage regardless of the application of other insurance.

Required limits may be satisfied by any combination of primary and umbrella liability insurances.

Contractors may maintain reasonable and customary deductibles, subject to approval by Webb County.

Insurance must be purchased from insurers that are financially acceptable to Webb County.

All insurance must be written on forms filed with and approved by the Texas Department of Insurance. Certificates of Insurance shall be prepared and executed by the insurance company or its authorized agent and shall contain provisions representing and warranting the following:

Sets forth all endorsements and insurance coverages according to requirements and instructions contained herein.

Shall specifically set forth the notice-of-cancellation or termination provisions to Webb County.

A copy of all required endorsements are to be provided along with the certificate(s) of insurance.

Upon request, Contractor shall furnish Webb County with certified copies of all insurance policies.

All contractors and subcontractors must be meeting minimum OSHA safety requirements as applicable to their operations.

Section 10. Payment and Performance Bonds

Contractor shall provide a payment bond in the penal amount of ONE MILLION SEVENTY-SEVEN THOUSAND SIX HUNDRED SIX DOLLARS AND TWENTY-FIVE CENTS 1,077,606.25 and performance bond in the amount of ONE MILLION SEVENTY-SEVEN THOUSAND SIX HUNDRED SIX DOLLARS AND TWENTY-FIVE CENTS 1,077,606.25. Bonds must be issued by companies authorized and admitted to do business in the State of Texas and rated A-:VII or better by A.M. Best Company (Best's Key Rating Guide, current Edition, and as amended) and/or otherwise acceptable to the County. Contractor shall supply the required Payment bond to the County within Seven (7) days of execution of this Contract or not later than Ten (10) working days prior the date of the scheduled installation of materials and provision of services under this contract which shall be the "DEADLINE" for compliance herewith and which both parties have mutually agreed to as an "Express Condition Precedent" to this contract.

Section 11. Limit of Appropriation.

Contractor has been advised by the County, and Contractor understands and agrees, such understanding and agreement being of the absolute essence of this agreement, that the County shall have available the sum of **\$1,077,606.25** specifically allocated to fully discharge any and all liabilities of the County under this Contract, and that the total maximum compensation that Contractor may become entitled to hereunder, and the total maximum sum that the County shall become liable to pay to Contractor hereunder, shall not exceed under any conditions, circumstances or interpretations thereof the amount certified for the applicable fiscal year.

Section 12. Termination.

Either party hereto may terminate this agreement at any time, either with or without cause, by giving the other party at least thirty days advance written notice. As soon as practicable after termination, Contractor shall submit, in accordance with Section 4, its statement showing in detail the services performed hereunder to the date of termination.

Section 13. Address of Notices.

Any notice required or permitted to be given by one party to the other party under this Agreement may be given by certified or registered U. S. mail, postage prepaid, addressed to the appropriate party as follows:

Webb County

Contractor

Tano E. Tijerina
Webb County Judge
1000 Houston Street, 3rd Floor
Laredo, Texas 78040

Thomas Donkers
Cognituv LLC
5004 Bee Creek Road Ste.320
Spicewood Texas 78669

Copy to:

Guillermo Cuellar, P.E.
Webb County Engineering Department
1620 Santa Ursula
Laredo, Texas 78040

Any notice given as herein provided shall be deemed given and received upon deposit in the U.S. mail.

Section 14. Entire Agreement.

This instrument contains the entire agreement between the parties relating to the rights granted and the obligations herein assumed. Any oral representations or modifications concerning this instrument shall be of no force or effect. This Contract shall be binding and effective only is and when it has been signed by both parties.

Section 15. Inconsistencies.

Where there exists any inconsistency between this Contract and other provisions of collateral contractual agreements that are made a part hereof by reference or otherwise, the provisions of this Contract shall control.

Section 16 Severability.

Each paragraph and provision hereof is severable from the entire Contract and if any provision is declared invalid, the remaining provisions shall nevertheless remain in effect.

Section 17 Law of Texas/Venue.

This Agreement shall be governed by and construed in accordance with the laws of the State of Texas without regards to choice of law rules of any jurisdiction and shall be enforced in the Webb County, Texas. County and Contractor agree that any litigation regarding this Contract shall take place in the State Court of Webb County, Texas.

Section 18 Entire Agreement.

This Agreement incorporates all the agreements, covenants, and understandings between the parties hereto concerning the subject matter hereof, and all such covenants, agreements, and understandings have been merged into this written Agreement. No other prior agreement or understandings, verbal or otherwise, of the parties or their agents shall be valid or enforceable unless signed by both parties and attached hereto and/or embodied herein.

Section 19 Amendment.

No changes to this Contract shall be made except upon written agreement of both parties.

Section 20 Headings.

The headings used herein are for convenience of reference only and shall not constitute a part hereof or affect the construction or interpretation hereof.

Section 21 Waiver.

The failure on the part of any party to exercise or to delay in exercising, and no course of dealing with respect to any right hereunder shall operate as a waiver thereof; nor shall any single or partial exercise of any right hereunder preclude any other or further exercise thereof or the exercise of any other right. The remedies provided herein are cumulative and not exclusive of any remedies provided by law or in equity, except as expressly set forth herein.

Section 22 Counterparts.

This Agreement may be executed in any number of and by the different parties hereto on separate counterparts, each of which when so executed shall be deemed to be an original, and such counterparts shall together constitute but one and the same document.

Section 23 Terminology and Definitions.

All personal pronouns used herein, whether used in the masculine, feminine, or neutral, shall include all other genders; the singular shall include the plural and the plural shall include the singular.

Section 24 Rule of Construction.

The parties hereto acknowledge that each party and its legal counsel have reviewed and revised this agreement, and the parties hereby agree that the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this agreement or any amendments or exhibits hereto.

Section 25 Immunity.

Webb County does not waive or relinquish any immunity or defense on behalf of themselves, their trustees, commissioners, offices, employees and agents as a result of the execution of this Agreement and performance of the functions and obligations described herein.

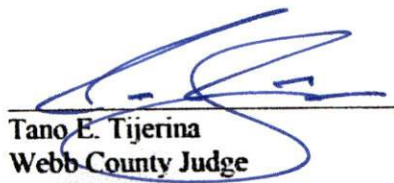
Section 26 Legal Compliance.

The parties hereto agree to comply fully with all applicable federal, state and local statutes, ordinances, rules, and regulations in connection with the programs contemplated under this agreement. In the event that any of the parties hereto are required by law or regulation to perform any act inconsistent with this agreement, or to cease performing any act required by this agreement, this agreement shall be deemed to have been modified to conform with the requirements of such law, regulation or rule.

This Agreement becomes effective when signed by the last party whose signing makes the Agreement fully executed.

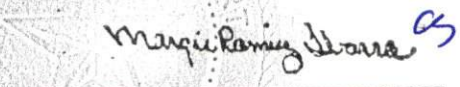
IN WITNESS WHEREOF, the parties aforesaid have duly executed the foregoing instrument, or caused the same to be executed in duplicate originals on the dates set forth below.

WEBB COUNTY

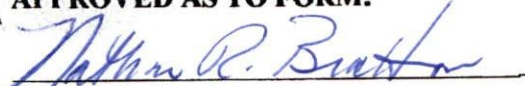

Tano E. Tijerina
Webb County Judge

Date: August 11, 2025

ATTESTED:


Margie Ramirez-Ibarra
Webb County Clerk

APPROVED AS TO FORM:


Nathan R. Bratton
Webb County Civil Legal Division

*By law, this office may only advise or approve contracts or legal documents on behalf of its clients. It may not advise or approve a contract or legal document on behalf of other parties. Our review of this document was conducted solely from the legal perspective of our client. Our approval of this document was offered solely for the benefit of our client. Other parties should not rely on this approval, and should seek review and approval of their own respective attorney(s).

CONTRACTOR
Cognituv, LLC


Thomas Donkers

Date: Aug 13, 2025

Exhibit A Installation Sites

Unnamed: 7	LOCATION	UNIT TAG#	Manufacturer	MODEL NUMBER	SERIAL NUMBER	Capacity	UVC Light Manuf.	JVC Model
1	LCPL DAVID L. ESPINOZA	AHU # 1	Carrier	40RUA16T2A5AUA	2424U24956	15 Tons	Lumalier	PRU-295
	RIO BRAVO FITNESS CENTER							
2	RIO BRAVO WATER UTILITIES	AHU # 1	Rheem	RH1T60245TANJA	W251520173	5 Tons	Lumalier	ADPL-160
3		AHU # 2	Rheem	RH1T60245TANJA	W211516506	5 Tons	Lumalier	ADPL-160
4	JP PCT. 2	PKG UNIT # 1	Trane	WHC060H3RGA29H601	230411883L	5 Tons	Lumalier	PRU-160
5		PKG UNIT # 2	Trane	WHC060H3RGA29H601	230611384L	5 Tons	Lumalier	PRU-160
6		PKG UNIT # 3	Trane	WHC060H3RGA29H601	230411646L	5 Tons	Lumalier	PRU-160
7		PKG UNIT # 4	Trane	WHC060H3RGA29H601	230611383L	5 Tons	Lumalier	PRU-160
8		PKG UNIT # 5	Trane	WHC060H3REA29H601	230213874L	5 Tons	Lumalier	PRU-160
9		PKG UNIT # 6	Trane	WHC060H3RBA29H601	230213892L	5 Tons	Lumalier	PRU-160
10	CONSTABLE PCT. 2	AHU # 1	Carrier	FB4CNF060	4819F05300	5 Tons	Lumalier	ADPL-160
11	RECORDS RETENTION BLDG.	AHU # 1	Carrier	40RM-008-H611HC	1495X06473	7.5 Tons	Lumalier	PRU-195
12		AHU # 2	Carrier	FB4BNF048	2104A73185	4 Tons	Lumalier	ADPL-160
13	ENGINEERING AND PUBLIC HEALTH BLDG.	AHU # 1	Trane	TWE090A3008B	K11H56XXL	7.5 Tons	Lumalier	ADPL-195
14		AHU # 2	Trane	TWV024B140A1	K33357460	2 Tons	Lumalier	ADPL-135
15		AHU # 3	Trane	TWV024B140A1	K33357455	2 Tons	Lumalier	ADPL-135
16		AHU # 5	Trane	TWE090A3008B	K11H56KKP	7.5 Tons	Lumalier	ADPL-195
17		AHU # 7	Trane	TWE06043AAAP004	194410708A	5 Tons	Lumalier	ADPL-160
18		AHU # 8	Trane	TWE048C14082	J2482389	4 Tons	Lumalier	ADPL-160
19		AHU # 9	Trane	TWV024B140A1	K07370289	2 Tons	Lumalier	ADPL-135
20	CARLOS AGUILAR ACTIVITY CENTER	AHU # 1	Carrier	FA4CNF048	0308A86643	4 Tons	Lumalier	ADPL-160
21		AHU # 2	Bryant	517EN036	1389A01985	3 Tons	Lumalier	ADPL-160
22	EL CENIZO COMMUNITY CENTER	AHU # 1	Carrier	FB4CNP060	4316A85847	5 Tons	Lumalier	ADPL-160
23		AHU # 2	Carrier	FB4CNP060	2422F11134	5 Tons	Lumalier	ADPL-160
24		AHU # 3	Carrier	FB4CNF036	3222F44123	3 Tons	Lumalier	ADPL-160
25	LA PRESA COMMUNITY CENTER	AHU # 1	WeatherKing	WH1P4821STANJA	W022232116	4 Tons	Lumalier	ADPL-160
26		AHU # 2	WeatherKing	WH1P4821STANJA	W022232212	4 Tons	Lumalier	ADPL-160
27		AHU # 3	WeatherKing	WH1P36175TANJA	W022232066	3 Tons	Lumalier	ADPL-160
28	RICARDO MOLINA SR. COMMUNITY CENTER	AHU # 1	Carrier	FB4CND060	4316A85848	5 Tons	Lumalier	ADPL-160
29		AHU # 2	Carrier	FB4CND060	1321F12062	5 Tons	Lumalier	ADPL-160
30		AHU # 3	Carrier	FB4CND036	0817A1967	3 Tons	Lumalier	ADPL-160
31	RIO BRAVO COMMUNITY CENTER	AHU # 1	First Co.	FCMCC160B152	7117C01664	5 Tons	Lumalier	ADPL-160
32	LARGA VISTA COMMUNITY CENTER	AHU # 1	Carrier	FB4CNP060	3022F01305	5 Tons	Lumalier	ADPL-160
33		AHU # 2	Carrier	FB4CNP060	3022F01263	5 Tons	Lumalier	ADPL-160
34		AHU # 3	Carrier	FB4CNP060	2922F10876	5 Tons	Lumalier	ADPL-160
35		AHU # 4	Rheem	RH1P2417STANJA	W261942443	2 Tons	Lumalier	ADPL-135
36		AHU # 5	Carrier	FB4BNB070	0304A73699	5 Tons	Lumalier	ADPL-160
37		AHU # 6	Rheem	RH1T60245TANJA	W261956626	2 Tons	Lumalier	ADPL-135
38	SANTA TERESITA COMMUNITY CENTER	AHU # 1	Carrier	FA4CNB060	0607A83323	5 Tons	Lumalier	ADPL-160
39		AHU # 2	Carrier	FA4CNB060	0607A83223	5 Tons	Lumalier	ADPL-160
40	RIO BRAVO SEWER PLANT	AHU # 1	Rheem	RHP4821STANJA	W2331504965	4 Tons	Lumalier	ADPL-160
41	FERNANDO SALINAS COMMUNITY CENTER	AHU # 1	Trane	GAM5A0L60M515AA	12117105F2V	5 Tons	Lumalier	ADPL-160
42		AHU # 2	Trane	GAM5A0L60M515AA	121718XX2V	5 Tons	Lumalier	ADPL-160
43		AHU # 3						
44		AHU # 4	Trane	GAM5A0L60M515AA	12166ND12V	5 Tons	Lumalier	ADPL-160
45		AHU # 5	Trane	GAM5A0L60M515AA	14463PKH4F	5 Tons	Lumalier	ADPL-160
154	LILIA PEREZ COMMUNITY CENTER	AHU # 1	Carrier	NOT IN SIGHT	NOT IN SIGHT	6 Ton	Lumalier	PRU-195
155		AHU # 1	Carrier	NOT IN SIGHT	NOT IN SIGHT	6 Ton	Lumalier	PRU-195
155		RTU#1	TRANE	NOT IN SIGHT	NOT IN SIGHT	4 Ton	Lumalier	PRU-160
46	FRED & ANITA BRUNI COMMUNITY CENTER	AHU # 1	Carrier	FA4BNF036	4005A70880	3 Tons	Lumalier	ADPL-160
47		AHU # 2	Carrier	FA4BNF030	2603A83405	2.5 Tons	Lumalier	ADPL-135

Exhibit A
Installation Sites

48		AHU # 3	Payne	PF5MNXD60	0625F15081	5 Tons	Lumalier	ADPL-160
49		AHU # 4	Carrier	FA4BNF030	3005A72083	2.5 Tons	Lumalier	ADPL-135
50	JUVENILE DETENTION CENTER	AHU # D1	Lennox	LPCAB14F4F0E60000	T07H63352	3.5 Tons	Lumalier	VFCU-135
51		AHU # E1	Bosch	BCHC0546280A3V03	T07H63325	4.5 Tons	Lumalier	VFCU-135
52		AHU # D2	Lennox	LPCAB14F4F0E60000	T07H63253	3.5 Tons	Lumalier	VFCU-135
53		AHU # G2	Lennox	LPCAB06F4F0E70000	T07H63255	1.5 Tons	Lumalier	VFCU-135
54		AHU # G1	Lennox	LPCAA0F0F4F0F60000	T07H632557	2 Tons	Lumalier	VFCU-135
55		AHU # G3	Lennox	LPCAB06F4F0E70000	T07H63259	1.5 Tons	Lumalier	VFCU-135
56		AHU # G4	Lennox	LPCAA06F4F0E60000	T07H63251	1.5 Tons	Lumalier	VFCU-135
57		AHU # G5	Lennox	LPCAB06F4F0E70000	T07H63256	1.5 Tons	Lumalier	VFCU-135
58		AHU # G6	Lennox	LPCAB06F4F0E70000	T07H63260	1.5 Tons	Lumalier	VFCU-135
59		AHU # F1	Lennox	LPCAB06F4F0E70000	T07A63254	1.5 Tons	Lumalier	VFCU-135
60		AHU # F4	Lennox	LPCAA12F4F5E00000	T07H63250	3 Tons	Lumalier	VFCU-135
61		AHU # F2	Lennox	LPCAB06F4F0F70000	T07H63258	1.5 Tons	Lumalier	VFCU-135
62		AHU # F6	Bosch	BVHC0S4G2B0A4V03	T07H63327	4 Tons	Lumalier	VFCU-135
63		AHU # F3	Bosch	BCHC036G280A4U02	T07H63326	3 Tons	Lumalier	VFCU-135
64	JJAEP	AHU # 1	Carrier	40RUAA16A1A6A0A0	3511U37929	15 Tons	Lumalier	PRU-295
65		AHU # 2	Carrier	40RUAA08A1A6A0A0	5111U53785	7.5 Tons	Lumalier	PRU-195
66		AHU # 3	Carrier	40RUAA08A1A6A0A0	5111U53787	7.5 Tons	Lumalier	PRU-195
67		AHU # 4	Carrier	40RUAA08A1A6A0A0	5111U53786	7.5 Tons	Lumalier	PRU-195
68		AHU # 5	Carrier	40RUAA08A1A6A0A0	5111U53747	7.5 Tons	Lumalier	PRU-195
69		AHU # 6	Carrier	FX4DNF037	3613A83576	3 Tons	Lumalier	ADPL-160
70		AHU # 7	Carrier	FX4DNF049	4213A82855	4 Tons	Lumalier	ADPL-160
71	COMMUNITY ACTION AGENCY	AHU # 1	Trane	TWE15043BA00A0	19081596WA	12.5 Tons	Lumalier	ADPL-295
72		AHU # 2	Trane	TWE15043BA00A0	194221369WA	12.5 Tons	Lumalier	ADPL-295
73		AHU # 3	Trane	TWE15043BA00A0	19421370WA	12.5 Tons	Lumalier	ADPL-295
74		AHU # 4		NOT IN SIGHT	NOT IN SIGHT			
75		AHU # 5	American Standard	TWE12043BA00A0	192637028A	10 Tons	Lumalier	ADPL-195
76		AHU # 6		NOT IN SIGHT	NOT IN SIGHT			
77	QUAD CITY FIRE STATION	AHU # 1	Carrier	FB4CN460	3422F08291	5 Tons	Lumalier	ADPL-160
78	MAIN FIRE STATION	AHU # 1	Trane	GAM5B0C60M51EAA	16284MM78V	5 Tons	Lumalier	ADPL-160
79		AHU # 2	Trane	GAM5B0336M31EAA	16282UURAV	3 Tons	Lumalier	ADPL-160
80	BOTINES FIRE STATION	AHU # 1	Rheem	RH1T6024STANJA	W061816070	2 Tons	Lumalier	ADPL-135
81	NUTRITION	AHU # 1	Carrier	FA4CN8060	1709A86767	5 Tons	Lumalier	ADPL-160
82	CENTER	AHU # 2	Carrier	FB4CNF060	0511A85640	5 Tons	Lumalier	ADPL-160
83	BUILDING MAINTENANCE FACILITY	AHU # 1	Carrier	FB4CNF036	3921F00954	3 Tons	Lumalier	ADPL-160
84		AHU # 2	Carrier	508ZN0065	2995B30478	5 Tons	Lumalier	PRU-160
85		AHU # 3	Carrier	508ZN0125	3095B30588	10 Tons	Lumalier	PRU-195
86		AHU # 4	Carrier	50B0-004-540	4195V92778	3 Tons	Lumalier	PRU-160
87		AHU # 5	Rheem	RH1T6024STANTJA	W142164742	2 Tons	Lumalier	ADPL-135
88		AHU # 6	Carrier	508ZN0065	2995B30480	5 Tons	Lumalier	PRU-160
89	CSCD ADULT PROBATION SOUTH	AHU # 1	Trane	TWE0990D300A	14413R048A	8.25 Tons	Lumalier	ADPL-195
90		AHU # 2	Trane	TWE0990D300A	1493MOEBA	8.25 Tons	Lumalier	ADPL-195
91		AHU # 3	Trane	TEN3A0C605519AB	150724462V	5 Tons	Lumalier	ADPL-160
92		AHU # 4	Trane	TWE0990D300A	1435P6M8A	8.25 Tons	Lumalier	ADPL-195
93		AHU # 5	Trane	TWE0990D300A	14351MEFBA	8.25 Tons	Lumalier	ADPL-195
94		AHU # 6	Trane	TWE0990D300A	15024MD58A	8.25 Tons	Lumalier	ADPL-195
95	1848 EVENT CENTER	PKG UNIT # 1	Carrier	50TC-D242K6A0A0A	4309U228228	20 Tons	Lumalier	PRU-295
96		PKG UNIT # 2	Carrier	50TC-D242K6A0A0A	4309U228227	20 Tons	Lumalier	PRU-295
97		PKG UNIT # 3	Carrier	50TC-D342K6A0A0A	4409U32370	25 Tons	Lumalier	PRU-395
98		PKG UNIT # 4	Carrier	50TC-D442K6A0A0A	4309U22831	30 Tons	Lumalier	PRU-395
99	1848 EVENT CENTER RESTAURANT	AHU # 1		NOT IN SIGHT	NOT IN SIGHT			
100	1848 EVENT CENTER MAIN OFFICE	AHU # 1	Carrier	FA4BNF048000AAA	2205A82183	4 Tons	Lumalier	ADPL-160
101	MEDICAL EXAMINER	AHU # 1	Rheem	RH1T60242TANJA	W492305900	2 Tons	Lumalier	ADPL-160
102		AHU # 2	Carrier	FA4CN8060	4207A86601	5 Tons	Lumalier	ADPL-160
103		AHU # 3	Carrier	FA4CN8060	4207A82650	5 Tons	Lumalier	ADPL-160
104		AHU # 4	Daikin	H3-CRB-8-0-162C-3ES	202103-CJE06601	13.5 Tons	Lumalier	PRU-295
105	ROAD AND BRIDGE	AHU # 1	Trane	4TEE3F49B1000A	8262ALF2V	4 Tons	Lumalier	ADPL-160
106	4801 FESCO	AHU # 2	Trane	4TEE3F37B1000A	82457PT1V	3 Tons	Lumalier	ADPL-180
107		AHU # 3	Trane	4TEE3F37B1000A	72635051V	3 Tons	Lumalier	ADPL-160

Exhibit A
Installation Sites

108		AHU # 4	Trane	4TEE3F37B1000A	7311U5T2V	3 Tons	Lumalier	ADPL-160
109		AHU # 5	Trane	4TEE3F49B1000A	8054HY424	4 Tons	Lumalier	ADPL-160
110		AHU # 6	Trane	4TEE3F65B1000A	63210M2V	5 Tons	Lumalier	ADPL-160
111	CASA BLANCA GOLF COURSE	AHU # 1	Rheem	RHGE-1002K	152E4594	10 Tons	Lumalier	PRU-195
112		AHU # 2	Rheem	RHGE-1002K	152E45943168	10 Tons	Lumalier	PRU-195
113		AHU # 3	Carrier	FY4ANB060	1109A85872	5 Tons	Lumalier	ADPL-160
114	JP PCT. 3	AHU # 1	Carrier	FB4CNF048	3022F25192	4 Tons	Lumalier	ADPL-160
115		AHU # 2	Carrier	FB4CNF048	3422F26497	4 Tons	Lumalier	ADPL-160
116		AHU # 3	Carrier	FB4CNF048	331A83262	4 Tons	Lumalier	ADPL-160
117	BRUNI COMMUNITY CENTER	AHU # 1	Trane	TEM4A0B365315BA	211731153B	3 Tons	Lumalier	ADPL-160
118		AHU # 2	Trane	TWE042C1400C0	3054QCP24	3.5 Tons	Lumalier	ADPL-160
119		AHU # 3		NOT IN SIGHT	NOT IN SIGHT			
120		AHU # 4	Rheem	RHK4M3047JA	W251326852	4 Tons	Lumalier	ADPL-160
121	RIO BRAVO WATER PLANT	AHU # 1	McQuay	MCCB003UA0C0UA	K04K32357A	3 Tons	Lumalier	ADPL-160
122		PKG UNIT # 1	Trane	TSC036A3RBA1BC0	44100840L	3 Tons	Lumalier	PRU-160
123		PKG UNIT # 2	Trane	TSC036A3RBA1BC0	445100906L	3 Tons	Lumalier	PRU-160
124		AHU # 2	McQuay	NOT Legible	Not Legible	4 Ton	Lumalier	PRU-160
125	BILLY HALL ADMIN BLDG.	EAST SIDE						
125		AHU # 1	Carrier	39TVUPAA-169531-AD	0601F62529	10 Tons	Lumalier	PRU-195
126		AHU # 2	Carrier	39TVUPAA-169531-AD	0601F62543	10 Tons	Lumalier	PRU-195
127		AHU # 3	Carrier	39TVUPAA-169531-AD	0601F62544	10 Tons	Lumalier	PRU-195
127		WEST SIDE						
128		AHU # 1	Carrier	39TVEPAA-169531-AD	0601F62529	10 Tons	Lumalier	PRU-195
129		AHU # 2	Carrier	39TVEPAA-169531-AD	0601F62530	10 Tons	Lumalier	PRU-195
130		AHU # 3	Carrier	39TVFPAA-169531-AD	0601F62526	10 Tons	Lumalier	PRU-195
131	CONSTABLE PCT. 4	AHU # 1	Rheem	RHIT60245TANJA	W142219036	5 Tons	Lumalier	ADPL-160
132		AHU # 2	Daikin	FTK809AXVJU	K003036	0.75 Tons	Lumalier	VFCU-135
133	JP PCT. 4	AHU # 1	Carrier	40RM-007-B610CH	3000F18289	7.5 Tons	Lumalier	PRU-195
134		AHU # 2	Carrier	40FKA006300	1601A006300	5 Tons	Lumalier	PRU-160
135		AHU # 3	Carrier	40FKA006300	1601A69652	5 Tons	Lumalier	PRU-160
136	SELF HELP CENTER	AHU # 1	Carrier	40RM-008-H611HC	1304123428	7.5 Tons	Lumalier	PRU-195
137		PKG UNIT # 1	Aaon	AVP48ACC09MO-1000	NOT IN SIGHT	4 Tons	Lumalier	ADPL-160
138		AHU # 2	Carrier	40RM-008-H611HC	2204F36244	7.5 Tons	Lumalier	PRU-195
139		AHU # 3	Carrier	FA48NF060	0304A73878	5 Tons	Lumalier	ADPL-160
140	NUTRITION CENTER	AHU # 1	Carrier	FA4CNB060	1709A86767	5 Tons	Lumalier	ADPL-160
141		AHU # 2	Carrier	FB4CF060	0511A85640	5 Tons	Lumalier	ADPL-160
142	EJ SALINAS COMMUNITY CENTER	AHU # 1	Rheem	RHGG-2402K949	227F20217490	20 Tons	Lumalier	PRU-295
143		AHU # 2	Carrier	FB4CNP060	4346885843	5 Tons	Lumalier	ADPL-160
144		AHU # 3	Carrier	FB4CN036	0817A71813	3 Tons	Lumalier	ADPL-160
145		AHU # 4	Carrier	FB4CN036	0817A71797	3 Tons	Lumalier	ADPL-160
146		AHU # 5	Carrier	40RM-012-H611HC	3103F56122	10 Tons	Lumalier	PRU-195
147		AHU # 6	Carrier	401UAA25A5A5A5	1017U03607	25 Tons	Lumalier	PRU-295
148		AHU # 7	Rheem	RHIP2417TANJA	W031908194	2 Tons	Lumalier	VFCU-135
149	BRUNI COMMUNITY CENTER	AHU # 1	Trane	TEM4ADB365315BF	211731153V	3 Tons	Lumalier	ADPL-160
150		AHU # 2	Trane	TWE042C1400C0	3054QCP24	3.5 Tons	Lumalier	ADPL-160
151		AHU # 3		NOT IN SIGHT	NOT IN SIGHT			
152		AHU # 4	Rheem	RHSL4M3017JA	W251326852	1.5 Tons	Lumalier	ADPL-135
153	MIRANDO ACTIVITY CENTER	AHU # 1	First Co.	FEM2X6000A	A063383919	5 Tons	Lumalier	ADPL-160
	DEAN SENATOR JUDITH ZAFFIRINI JUSTICE CENTER BUILDING	All HVAC Units						
	WEBB COUNTY JAIL	All HVAC Units						
	COUNTY COMMISSIONERS COURTHOUSE	All HVAC Units						

EXHIBIT B
GENERAL CONDITIONS AND SPECIFICATIONS

Article I GENERAL CONTRACT REQUIREMENTS

Section 1.01 Description of Work.

The purpose of this Contract is for the Contractor to furnish all labor, equipment, materials, and incidentals necessary to undertake the Scope of Services outlined in Section 1 of the Agreement.

Section 1.02 Location & Construction Schedule.

Contractors Services under this Agreement shall be performed at the Webb County Justice Center, 1101 Victoria Street, Suite 106, Laredo, Texas 78041.

At the County Representative request the Contractor shall provide a construction schedule. The construction schedule will be a bar-type schedule and shall be of sufficient detail to show construction sequence for different items of work.

Section 1.03 Permits & Licenses.

If required, the Contractor shall procure all permits and licenses, pay all charges and fees and give all notices necessary and incidental to the due and lawful prosecution of the work.

Section 1.04 Subcontractors.

At the request of the County Representative, the Contractor must submit a list of all subcontractors prior to commencing work. During the course of this project, the County Representative must be notified of any changes in subcontractors.

Article II. PROSECUTION OF THE PROJECT

Section 2.01 Parking.

The Contractor shall be responsible for the parking of his vehicles in a legal manner at no additional expense or inconvenience to Webb County.

Section 2.02 Storage.

1. General - The Contractor shall be fully responsible for the security and safe keeping of any stored materials.
2. The Contractor may use approximate open areas of the site for storage of materials at his own risk. The County must approve of storage areas.
3. The Contractor may not use any existing part of any existing Webb County building for storage of materials unless approved in writing to do so by the County Representative.
4. Remote - The Contractor may use a location "on" or "off" the job site for storage of materials.

However, if he intends to submit requests for payment for stored materials, then Webb County, at its discretion, may pay for actual cost of material stored (less stipulated retainage) under the following conditions:

- a. The Contractor shall apply for and receive advanced written approval from the County Representative.
- b. The intended location must be judged suitable and secure by the County Representative and the materials shall be fully insured.
- c. The Contractor shall pay all costs related to the storage including loading, unloading, transportation, warehouse rent, and insurance.
- d. The quantity and quality of material shall be inspected by the County representative, to ascertain compliance with the Contract Documents, paid invoices and materials list.

Section 2.03 Hours of Work.

1. The building/site will be occupied by Webb County during the course of the project.
2. The County Representative shall establish time/hours that work shall be executed as best to suit the facility function and/or activity.
3. If it becomes necessary to work on weekends, holidays, and after the hours established by the County Representative, a written request to work shall be submitted for approval to the County, twenty-four (24) hours prior to performing the work. Access to the site during these hours shall be coordinated through the County Representative.
4. Work shall be performed so as to not interfere with normal activities occurring outside the work area.
 - a. Building Projects - If inclement weather impacts any portion of the project such that the project completion date is delayed (regardless of whether work is being performed on any other scheduled portion of the project during that time), then that day shall be deemed an Inclement Weather Day or Rain Day.

Section 2.04 Work Commencement.

If requested by the County Representative, the Contractor shall notify the County Representative forty-eight (48) hours prior to starting or restarting work on the project.

Section 2.05 Cover-up Inspection

The Contractor shall notify the County Representative a minimum of forty-eight (48) hours prior to any cover-up inspection. Any work covered-up prior to inspection and sign off shall be considered non-conforming to contract requirements.

Section 2.06 Wage Scale Posting.

If requested by the County Representative, the Contractor shall post the wage scale at all times at the site of work in a prominent place where it can be easily seen by the workers.

Section 2.07 Pay Estimate Posting.

If requested by the County Representative, the Contractor shall post the most current processed monthly pay estimate for the project at the site of work in a prominent place where it can be easily seen by the subcontractors.

Article III. CONTRACT ADMINISTRATION PROCEDURES

Section 3.01 Clarifications.

All clarifications required by the Contractor shall be requested in an expeditious manner from the County Representative in the written form of a Request for Information (RFI). No additional compensation to the Contractor will be allowed for delays resulting from late requests for clarifications. Responses to RFI's will not be binding on Webb County until confirmed in writing by the County Representative.

Section 3.02 Field Modifications.

No person shall have the authority to verbally alter the requirements of the contract documents. No field modifications will be binding on Webb County unless confirmed in writing from the County Representative, or documented, signed and dated by the Representative on the set of "Record Drawings" in the field office.

Section 3.03 Changes in Contract:

All proposed costs for a change in contract must be supported by itemized accounting of material, equipment and labor in sufficient detail to allow value analysis by the County Representative. Webb County shall have up to ten (10) calendar days from date of receipt of written proposal for review and approval by the County Representative.

On changes involving both additions and deletions, percentages for overhead and profit will be allowed only on the net addition.

Section 3.04 Preservation and Restoration of Property.

Webb County reserves the right to repair damages to existing property made necessary through an act, omission or misconduct, or in consequence of the non-performance of the Work on the part of the Contractor, his employees or subcontractors, if the Contractor fails to respond to written demand for the repair within 24 hours of such notification; Repairs made by the County on the Contractor's behalf shall be reimbursed by the Contractor to the County or said costs of repairs may be deducted from amounts owed to the Contractor.

Section 3.05 Substantial Completion.

Substantial Completion occurs when the project can be used for its intended purpose. Substantial completion occurs when all mechanical, and electrical systems and fixtures are operational. The County Representative shall issue a substantial completion certificate setting forth a time limit for remedying the punch list items, as determined by the County Representative. The substantial completion certificate effectively stops the contract time. Failure of the Contractor to complete punch list items within the time limit shall result in the assessment of liquidated damages being assessed against the contract in an amount equal to one half of the liquidated damages applicable to delays prior to substantial completion. Warranty periods and dates for the owner to assume responsibility for utilities, shall be the date of substantial completion.

Section 3.06 Warranties.

All items having a manufacturer's warranty installed under this contract shall be installed by or under the directive of the manufacturer or his certified agent in order to conform with the manufacturer's warranty requirements. All work involving manufacturer's products shall be performed in accordance with manufacturer's recommendations in order to maintain all warranties.

Section 3.07 Emergencies.

In emergencies affecting the safety or protection of persons, or the Work, or Property at the site, or adjacent thereto, the Contractor, without special instruction or authorization from the County or the County Representative, is obligated to act to prevent threatened damage, injury or loss. The Contractor shall give the County Representative prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Document have been caused thereby.

Barricades, Warning Lights & Signs on All Projects.

Unless provided otherwise in the Contract Documents, the Contractor is Solely responsible for furnishing, erecting and maintaining, suitable barricades, warning signs, flares, barriers, cones, lights, flags, signals, flagmen and other traffic control devices as are or may be necessary to adequately protect the Work and shall warn, advise and safeguard the public over the entire project, including, but not limited to, sections of the project which the Contractor closes to traffic.

The Contractor's responsibility in this regard extends for the entire duration of the Work, from the start of construction until acceptance by the County. All barricades, signs and other types of devices necessary for traffic control and to protect the Work shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices".

Section 3.08 Sanitary Provisions.

The Contractor shall provide and maintain in a neat, sanitary condition, such accommodations for the use of its employees as may be necessary to comply with the requirements of any Federal, State, County or City laws, ordinances or regulations.

Section 3.09 Safety & Health Standards.

The Contractor shall observe and comply with all safety and health standards and to all legislation and amendments enacted for the safety and health of Contractor's employees. Such safety and health standards shall apply to all Subcontractors, and the Contractor shall be responsible for initiating, maintaining, supervising and inspecting safety programs, safety systems and safety precautions, including, but not limited to, trench safety requirements, in connection with the Work.

Section 3.10 Authority of County Representative.

The Work shall be done under the direct observation of the County Representative and to the Representative's satisfaction. The County Representative shall decide any and all questions which may arise as to the quality or acceptability of materials furnished, work performed, and rate of progress of the Work, and shall decide all questions which may arise as to the interpretation of the Drawings and Specifications and all questions as to the acceptable fulfillment of the Contract on the part of the Contractor. The County Representative's decisions under this provision shall be final and binding on both parties hereto.

Section 3.11 Contractor's Responsibility for Work.

Until the acceptance of the Work by the County Representative as evidenced in writing; the Work shall be under the charge and care of the Contractor. The Contractor shall take every necessary precaution against injury or damage to any part thereof by the action of the elements or from any cause, whether arising from the execution or non-execution of the Work. The Contractor shall rebuild, repair, restore and make good at the Contractor's own expense all injuries or damages to any portion of the Work before its completion and acceptance. The Contractor shall keep the premises free from accumulation of waste materials, rubbish, and other debris resulting from the Work. At the completion of the Work, the Contractor shall leave the site clean and ready for its use by the County.

Section 3.12 Preservation & Restoration of Property.

The Contractor shall be responsible for the preservation of the County's property adjacent to the project. When or where any direct or indirect damage is done to the County's, or adjacent, property by or on account of any act, omission, neglect or misconduct in the performance of the Work or in consequence of the nonperformance thereof on the part of the Contractor, the Contractor shall restore, at the Contractor's own expense, such property to a condition equal to that existing before such damage was done by repairing, rebuilding or otherwise restoring same, or the Contractor will make good such damage in an acceptable manner.

Protection against Claims of Subcontractors, Laborers, Material & Furnishers of Machinery.

The Contractor shall indemnify and save the County harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools and all supplies, including commissary, incurred in the furtherance of the performance of the Contract. When so desired by the County, the Contractor shall furnish satisfactory evidence that all obligations of the nature herein above designated have been paid, discharged or waived.

Exhibit B

Cognituv, LLC Webb County

2025-005 ARPA Project No. 11-Webb County UV-C Lights Project

Section 3.13 Inspection.

Inspectors/County Representative shall be authorized to inspect all work in progress, all Work completed and all materials furnished. The Inspector/County Representative shall not be authorized to revoke, alter, enlarge, relax or release any requirements of these Specifications. If requested by the County Representative, the Contractor shall also furnish the County Representative a statement from the Subcontractor that the Subcontractor understands the Drawings and Specifications and is properly qualified to perform such Work. No Subcontract will in any way affect the terms of the Contract between the County and the Contractor or relieve the Contractor of any of its obligations thereunder.

The Inspector/County Representative shall at all times have access to all parts of the shop where material under this Contract is being manufactured. Material that does not conform to the Specifications accepted through oversight or otherwise; may be rejected at any stage of the Work. The Contractor shall remove and rebuild at the Contractor's own expense any part of the project that has been improperly executed, even if it has been included in the monthly estimates. If the Contractor refuses or neglects to correct any defective work, it may be corrected by the County, at the Contractor's expense.

Whenever the Contractor is permitted or directed to do night work, or to vary the period during which the Work is carried on each day, the Contractor shall give the County Representative due notice so that inspections may be performed. Such Work shall be done without extra compensation. The Contractor will furnish the County Representative a schedule for this night work.

Should the County Representative require it, the Contractor shall at any time during the construction of Work, make openings for inspection through any part of said Work to such extent as the County Representative may direct, and the Contractor shall make the same good again to the satisfaction of the County Representative. Should the Work, from the opinion of the County Representative, be found to be faulty in any respect, the Contractor at the Contractor's expense shall replace all such faulty Work.

Section 3.14 Record Documents.

The Contractor shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders and written interpretations and clarifications in good order and annotated to show all changes made during construction. These Record documents, together with all approved Samples and a counterpart of all approved Shop Drawings, will be available to County Representative for reference. Upon completion of the Work, these Record documents, along with all Samples and Shop Drawings, must be delivered to the County Representative.

Section 3.15 Abandonment of Work.

If the Contractor fails to begin the work within the time specified; or fails to make deliveries on to provide sufficient workmen and equipment or sufficient materials to insure the prompt

completion; or performs the Contract unsuitably; or neglects or refuses to remove materials or perform a new such Work as shall have been rejected as defective or unsuitable; or discontinues the prosecution of the Work; or becomes insolvent or is declared bankrupt; or commits any act of bankruptcy or insolvency; or allows any final judgment to stand against the Contractor unsatisfied for a period of forty-eight (48) hours or longer; or makes an assignment for the benefit of creditors; or fails to comply with any of the conditions of the Contract to such an extent that the Contract is forfeited or abandoned by the Contractor, or declared abandoned or suspended by the County; or if the Contractor for any other cause whatsoever shall not carry on the Work or perform the Contract in an acceptable manner, then and in that event, the Surety on the Contractor's Performance Bond shall have the right and privilege, within seven (7) calendar days after the date of notice of such action from the County, to assume control of the Contract and all Work thereunder and to sublet or complete the Work in strict conformity with the provisions of said Contract. Failure of the Surety to do so within said seven (7) calendar days will result in an immediate forfeiture of all right to thereafter assume control of the Contract and the Work thereunder, in which event the County shall have the right to take the prosecution of the Work out of the hands of the Contractor and to appropriate or use any or all materials and equipment on the ground as may be suitable and acceptable, and enter into an agreement for the completion of the Contract according to the terms and provisions thereof or use such other methods as in the County Representative's opinion may be required or desirable for the completion of the Contract in an acceptable manner. All costs and charges incurred by the County, together with the costs of completing the Work, shall be deducted from any money due or which may become due said Contractor. In the event the cost and expense so incurred by the County is less than the sum which would have been payable under the Contract if it had been completed by said Contractor, then the said Contractor and/or Surety shall be entitled to receive the difference. In the event such cost shall exceed the amount which would have been payable under the Contract, then the Contractor and Surety shall be liable and shall pay to the County the amount of said excess.

Section 3.16 Termination for Convenience of the County.

The County may terminate this Agreement at any time by notice in writing to the Contractor. Upon receipt of such notice, the Contractor shall stop all work. Within thirty (30) days after receipt of notice of termination, the Contractor shall submit a statement, showing in detail the work performed under this Agreement to the date of termination. The County shall then pay the Contractor that proportion of the contract price which the work actually performed under this Agreement bears to the total work called for under this Agreement, less such payments as have been previously made. The County suggests that the Contractor have a similar termination provision in all its contracts inasmuch as the County will not compensate the Contractor for loss of profits or any other damage resulting from such termination.

Section 3.17 Guarantee.

The Contractor agrees to replace, without cost to the County, any Work found to be improper or defective and to make good all damage or other Work caused by such replacement. The guarantee period for the Work is one year from substantial completion of the project. Additional guarantees for specific items may also be required by the Specifications. The guarantees must be presented to, and approved by, the County Representative before project acceptance and Final Payment is made.

The Contractor will supply the County with copies of all guarantees and warranties, which have been made to the Contractor by suppliers or Subcontractors, with an assignment of these guarantees and warranties to the County. Assignments will not relieve the Contractor of the Contractor's responsibility in the case of a supplier's or Subcontractor's failure to fulfill guarantee or warranty provisions. If the Contractor is prevented for any reason from making any such assignment to the County, the Contractor hereby gives the County permission to enforce any and all non-assignable guarantees and warranties in the Contractor's name, and the Contractor shall pass on to the County any benefits derived therein.

Neither final completion of the project, nor any provision in the Contract Documents relieves the Contractor of responsibility for faulty materials or workmanship during guarantee periods.

CONSTRUCTION DOCUMENTS AND SPECIFICATIONS

5/16/2025



DIVISION 23 – HEATING VENTILATION & AIRCONDITIONING

- 23 00 00 HEATING, VENTILATION AND AIR-CONDITIONING (HVAC)
- 23 05 00 COMMON WORK RESULTS FOR HVAC
- 23 43 12 UV-C GERMICIDAL IRRADIATION SYSTEM FOR HVAC EQUIPMENT AND DUCTWORK

DIVISION 26 –ELECTRICAL

- 26 00 00 ELECTRICAL
- 26 00 01 ELECTRICAL GENERAL REQUIREMENTS
- 26 05 19 LOW VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
- 26 05 26 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
- 26 05 29 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
- 26 05 33 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS
- 26 28 13 FUSES

SECTION 23 00 00

HEATING, VENTILATION AND AIR-CONDITIONING (HVAC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
- B. Mechanical Contract Documents were prepared for the Project by:

Trinity MEP Engineering, LLC
3533 Moreland Dr. Ste. A
Weslaco, Texas 78596
Phone Number: (956) 973-0500
Contact Person: Leonardo Munoz, P.E.

C. General Scope of Work:

1. Install AC equipment and ductwork as shown on the contract documents. Refer to drawings for schedule of equipment that will be installed. After installing equipment, connect power to unit.
2. HVAC: Provide all materials and labor associated with a complete operational installation of new HVAC systems including, but not limited to:

- UV-C Lights

1.3 COORDINATION

- A. All mechanical work shall be done under sub-contract to a General Contractor. Mechanical Contractor shall coordinate all work through General Contractor, even in areas where only mechanical work is to take place.
- B. Coordination between all trades shall take place on a regular basis to avoid conflicts between disciplines and equipment clearances.
- C. Work shall take place with minimal disruption to Owner's operations in areas surrounding the new building.
- D. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
- E. Fully coordinate with electrical contractor for providing power to mechanical equipment.
- F. Mechanical Contractor is responsible for all control wiring including thermostat(s). This includes all conduit, wire, and accessories both low voltage and source voltage for the controls' system. Mechanical

Contractor will provide all the necessary actuators, relays, software, hardware, and all necessary accessories required for a fully functional controls' system.

1.4 UTILITIES

1. Coordinate with power, water, telephone, cable and gas utilities to locate all utilities prior to digging in any area.
2. Obtain any approvals required from utilities to relocate utilities.
3. Cost of relocating or bypassing utilities indicated on drawings shall be included in Base Bid.

1.5 CONTRACTOR USE OF PREMISES

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 1. Owner Occupancy: Allow for Owner occupancy and use by the public.
 2. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the following:
 1. Temporary fencing around construction areas.
 2. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
 3. Temporary fencing around equipment while site work is in progress.

1.6 SUBMITTALS

1. To expedite the submittal process more efficiently, DO NOT piece-meal the submittals. Submit entire mechanical or plumbing in a bound enclosure. This will eliminate delays in the submittal process.

END OF SECTION

SECTION 23 05 00

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

1.2 SUMMARY

- A. This Section includes the following basic mechanical materials and methods to complement other Sections.
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Concrete base construction requirements.
 - 3. Escutcheons.
 - 4. Dielectric fittings.
 - 5. Flexible connectors.
 - 6. Mechanical sleeve seals.
 - 7. Equipment nameplate data requirements.
 - 8. Nonshrink grout for equipment installations.
 - 9. Field-fabricated metal and wood equipment supports.
 - 10. Installation requirements common to equipment specification sections.
 - 11. Cutting and patching.
 - 12. Touchup painting and finishing.

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, crawl spaces, 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 plastic materials:
- G. PVC: Polyvinyl chloride plastic.
- H. The following are industry abbreviations for rubber materials:

- 1. EPDM: Ethylene propylene diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For dielectric fittings, flexible connectors, mechanical sleeve seals, and identification materials and devices.

- B. Coordination Drawings: 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. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Include the following:
 - 1. Planned piping layout, including valve and specialty locations and valve-stem movement.
 - 2. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
 - 3. Sizes and location of required concrete pads and bases.
 - 4. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 - 5. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, and other ceiling-mounted items.

1.5 QUALITY ASSURANCE

- A. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.
- B. Equipment Selection: Equipment of higher electrical characteristics, physical dimensions, capacities, and ratings may be furnished provided such proposed equipment is approved in writing and connecting mechanical and electrical services, circuit breakers, conduit, motors, bases, and equipment spaces are increased. Additional costs shall be approved in advance by appropriate Contract Modification for these increases. If minimum energy ratings or efficiencies of equipment are specified, equipment must meet design and commissioning requirements.

1.6 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 prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes, ductwork, equipment, and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor, if stored inside.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 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 architectural section.

- 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.

1.8 OPERATION PRIOR TO ACCEPTANCE

- A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, he may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated.
- B. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments, and complete punch list items before final acceptance by the Owner.
- C. The date of acceptance by the Engineer, for beneficial use by the Owner, shall be the beginning date of the warranty period.

1.9 SPACE AND EQUIPMENT ARRANGEMENT

- A. The size of each item of mechanical equipment shown on the Drawings is based on the dimensions of a particular manufacturer as indicated. While other manufacturers may be acceptable, it shall be the responsibility of the Contractor to determine whether or not the equipment he proposes to furnish will fit into the space. Shop drawings shall be prepared when required by the engineer to indicate a suitable arrangement.
- B. Install equipment in a manner to permit access to all surfaces. Install valves, motors, drives, lubricating devices, filters, and other accessory items in a position to allow removal for service without requiring the disassembly of another part.
- C. Provide access panels acceptable to the Engineer for equipment that is concealed above ceiling space.
- D. Large equipment assemblies or components which will be installed in the building, and which are too large to permit access through doorways, stairways or shafts, shall be brought to the site and placed in the appropriate spaces before the enclosing structure is completed. Provisions shall be implemented by the Contractor to insure that the equipment will not be damaged in any way during the associated construction procedures.

1.10 START-UP OF EQUIPMENT AND SYSTEMS

- A. Whenever the manufacturer of a particular item of equipment or a particular system makes available a start-up service after completion of the installation, such manufacturer's start-up service (rendered by the manufacturer or his authorized representative) shall be provided.
- B. Witnessing and explanations of start-up services shall be included as part of the "Instruction of Owner's Personnel" as specified below.

1.11 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of competent engineers or technicians acceptable to the Engineer to instruct representatives of the Owner in complete and detailed operation and maintenance of each item of equipment, and each system. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.
- B. The Contractor shall be fully responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.

- C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include piping diagrams, valve identification charts, control and interlocking wiring diagrams, manufacturers' operation and maintenance manuals, parts lists (with sources identified), and other data as appropriate for each system, and as required elsewhere in the Specifications to be furnished to the Owner prior to final acceptance of the project.
- D. Provide the Owner with three (3) complete sets of all maintenance manuals, pamphlets, brochures or instructions. This material shall be catalogued, indexed and bound into books.

1.12 ACCEPTABLE MANUFACTURERS

- A. A. Provide equipment and materials from listed manufacturers listed within this specification. Deviations from this specification will not be acceptable. When one manufacturer is listed, alternate materials and equipment may be provided "equal to" the listed. When more than one manufacturer is listed, equipment and material must be provided by one of the listed manufacturers.

PART 2 - PRODUCTS

2.1 STANDARD PRODUCTS

- A. Each item of equipment furnished under this Division of the Specifications shall be essentially the standard product of the manufacturer. Where two or more units of the same kind or class of equipment are required, these shall be the products of a single manufacturer; however, the component parts of the equipment need not be the products of one manufacturer.
- B. Materials and equipment shall be of the base quality normally used in good commercial practice, and shall be the products of reputable domestic manufacturers unless otherwise specified. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.

2.2 QUALITY AND CLASSIFICATION OF MATERIALS

- A. Materials and equipment shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials or equipment damaged in shipment or otherwise damaged prior to installation shall not be repaired at the job site, but shall be replaced with new materials or equipment identical with those damaged.
- B. Wherever a UL standard has been established for a particular type of material or equipment, each such material or equipment provided on this project shall meet the requirements of the UL standard in every way and shall be UL listed and labeled.

2.3 LOCAL PARTS AND SERVICE

- A. Each item of equipment furnished on this project shall have local representation, factory-authorized service, and an adequate stock of repair parts. "Local" shall be defined, for this purpose, as "within 50 miles of the project site."

2.4 FLAME SPREAD PROPERTIES OF MATERIALS

- A. Materials used for insulation, acoustical linings, adhesives, jackets and coatings, and combinations of these materials, shall each have a flame spread rating of 25 or less, and a smoke developed rating of 50 or less, as determined by an independent testing laboratory in accordance with NFPA-255.

2.5 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Dielectric Unions:

- a. Watts Industries, Inc.; Water Products Div.
- b. Zurn Industries, Inc.; Wilkins Div.
- 2. Mechanical Sleeve Seals:
 - a. Calpico, Inc.
 - b. Metraflex Co.
 - c. Thunderline/Link-Seal.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular design, with interlocking rubber links shaped to continuously fill annular space between pipe and sleeve. Include connecting bolts and pressure plates.

2.7 PIPING SPECIALTIES

- A. Sleeves: The following materials are for wall, floor, slab, and roof penetrations:
 - 1. Steel Sheet Metal: 0.0239-inch minimum thickness, galvanized, round tube closed with welded longitudinal joint.
 - 2. Steel Pipe: ASTM A 53, Type E, Grade A, Schedule 40, galvanized, plain ends.
 - 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 - 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- B. Escutcheons: Manufactured wall, ceiling, and floor plates; deep-pattern type if required to conceal protruding fittings and sleeves.
 - 1. ID: Closely fit around pipe, tube, and insulation of insulated piping.
 - 2. OD: Completely cover opening.
 - 3. Cast Brass: One piece, with set screw.
 - a. Finish: Rough brass.
 - b. Finish: Polished chrome-plate.
 - 4. Cast-Iron Floor Plate: One-piece casting.

2.8 GROUT

- A. Nonshrink, Nonmetallic Grout: ASTM C 1107, Grade B.
 - 1. Characteristics: Post-hardening, volume-adjusting, dry, hydraulic-cement grout, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psig, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. General: Install piping as described below, unless piping Sections specify otherwise. Individual Sections specify unique piping installation requirements.
- B. General Locations and Arrangements: 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 at indicated slope.
- D. Install components with pressure rating equal to or greater than system operating pressure.

Exhibit B

- E. Install piping in concealed interior and exterior locations, except in equipment rooms and service areas.
- F. Install piping free of sags and bends.
- G. Install exposed interior and exterior piping at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
- H. Install piping tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for ceiling panel removal.
- I. Install piping to allow application of insulation plus 1-inch clearance around insulation.
- J. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- K. Install fittings for changes in direction and branch connections.
- L. Install couplings according to manufacturer's written instructions.
- M. Install pipe escutcheons for pipe penetrations of concrete and masonry walls, wall board partitions, and suspended ceilings according to the following:
 - 1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish.
 - 2. Uninsulated Piping Wall Escutcheons: Cast brass or stamped steel, with set screw.
 - 3. Uninsulated Piping Floor Plates in Utility Areas: Cast-iron floor plates.
 - 4. Insulated Piping: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
 - 5. Piping in Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.
- N. Sleeves are not required for core drilled holes.
- O. Install sleeves for pipes passing through concrete and masonry walls, and concrete floor and roof slabs.
- P. 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. Build sleeves into new walls and slabs as work progresses.
 - 3. Install sleeves large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials: Steel Pipe Sleeves: For pipes smaller than 6-inch NPS.
 - b. Steel, Sheet-Metal Sleeves: For pipes 6-inch NPS and larger, penetrating gypsum-board partitions.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using elastomeric joint sealants.
 - 5. Use Type S, Grade NS, Class 25, Use O, neutral-curing silicone sealant, unless otherwise indicated.
- Q. Aboveground, Exterior-Wall, Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe or pipe insulation 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 in diameter and larger.
 - 3. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall, Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Size sleeve for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Assemble and install mechanical sleeve seals according to manufacturer's written instructions.
Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestopping materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- V. Piping Joint Construction: Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
 1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Soldered Joints: Construct joints according to AWS's "Soldering Manual," Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook."
 4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 5. 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:
 - a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
 - b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
 - c. Align threads at point of assembly.
 - d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
 - e. 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.
 6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
 7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.
 8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Nonpressure Piping: ASTM D 2855.
 - c. PVC to ABS Nonpressure Transition Fittings: Procedure and solvent cement according to ASTM D 3138.
 9. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 procedures and manufacturer's written instructions.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
- W. Piping Connections: Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.
2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.2 EQUIPMENT AND MATERIAL INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment and material to provide maximum possible headroom, if mounting heights are not indicated.
- B. Install equipment according to approved submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.
- C. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- D. 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.
- E. Install equipment and ductwork giving right of way to piping installed at required slope.
- F. Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.3 PAINTING AND FINISHING

- A. Refer to paint materials, surface preparation, and application of paint.
- B. Do not paint piping specialties with factory-applied finish.
- C. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit. Follow supported equipment manufacturer's setting templates for anchor bolt and tie locations. Use 3000-psi, 28-day compressive-strength concrete and reinforcement or as specified.

3.5 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.6 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces necessary for mechanical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair cut surfaces to match adjacent surfaces.

3.7 GROUTING

- A. Install nonmetallic, nonshrink, grout for mechanical equipment base bearing surfaces, pump and other equipment base plates, and anchors. Mix grout according to manufacturer's written instructions.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placing of grout.

Exhibit B

Cognituv, LLC - Webb County

COMMON WORK RESULTS FOR HVAC

- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases to provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout according to manufacturer's written instructions.

END OF SECTION

SECTION 234312

UV-C Germicidal Irradiation System for HVAC Equipment and ductwork

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Sections includes the following HVAC system components:
 - 1. UV-C Germicidal Irradiation System for Air Stream Disinfection mounted inside air handling units, packaged units, supply or return ducts
 - 2. Surface Treatment and Maintenance of Cooling Coils UV-C Germicidal Irradiation System for Surface Treatment and Maintenance of cooling coils mounted inside air handling units or packaged units
- B. Related Work Specified in other sections:
 - 1) Section 233300.00 "Air Duct Accessories" for restoration of opened ducts and plenums with access doors.

1.3 REFERENCES

- A. Current ASHRAE Handbook—HVAC Applications Chapter 60 – Ultraviolet Air and Surface Treatment
- B. Current ASHRAE Handbook—HVAC Systems and Equipment Chapter 17 – Ultraviolet Lamps Systems

1.4 ACTION SUBMITTALS

- A. Product Data: Manufacturer's literature for UV-C Fixtures indicated.
 - 1. Dimensions, weights, capacities and ratings.
 - 2. Wiring diagrams.
 - 3. Components and accessories.
 - 4. Catalog cuts, engineering data sheets, list of unit numbers, UV-C Fixtures output and power consumption
- B. Installation, operation and maintenance manuals.
- C. UV-C Fixture Selection and Performance Summary
- D. Intensity Profiles

**UV-C HERMICIDAL IRRADIATION SYSTEM
FOR HVAC EQUIPMENT AND DUCTWORK**

1. Computation Modeling Software report, showing tabular and graphical representation of UV-C disinfection modeling calculations, irradiation, intensity, and UV dosage calculations used to determine fixture placement, energy distribution and projected disinfection rates of targeted pathogens.

E. ISO Certifications

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum 5 years of documented experience.

B. Competency of Supplier/Manufacturer/Installer

1. The supplier/local distributor of the UV-C Fixtures system to have a qualified service organization in active operation. The organization to have had a history of competent service experience in installing and maintaining the specific types of systems described in the specifications, and has on its payroll sufficient qualified, experienced personnel to guarantee satisfactory performance of the installation. All maintenance personnel used in fulfilling the requirements of the installation shall be qualified to maintain this type of equipment.

C. Built in accordance with ISO 9001 procedures

D. Product Qualifications:

1. NRTL (UL,ETL) Compliance:
 - a. UV-C Fixtures shall comply, meet or exceed ETL/UL Standards: 153, 1598 & 1995 respectively.
 - b. UV-C Fixtures to be factory tested and the design, construction and installation to be in accordance with all applicable regulations having jurisdiction.
2. The manufacturer shall have the following test and verification capabilities and shall be able to provide test reports, as required, for the following:
 - a. Testing for lamp life: verification that the UV-C lamps and power supplies will properly perform to the manufacturers rating.
 - b. The ability to test lamps for UV output under air flows up to 650 ft. per minute (198 m/min) and temperatures of 45 deg. F (7 Deg. C) to 135 deg. F (57 Deg. C) to validate performance in an HVAC system.
 - c. UV-C material degradation test chamber and testing capability and data bank

UV-C HERMICIDAL IRRADIATION SYSTEM
FOR HVAC EQUIPMENT AND DUCTWORK

of typical HVAC system materials performance under exposure to UV-C
(ASHRAE 17.6)

3. The manufacturer shall have the capability to factory apply UV-C transparent polymer sleeves to lamps when specified.
- E. Production Testing
 1. The manufacturer shall apply power to each UV-C Fixture and test the operation of power supply and lamp during production, data by date code for each UV-C Fixture.
 2. Upon request, the manufacturer shall provide traceability and test data.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store UV-C Fixtures in a clean, dry place and protect from weather and construction traffic. Handle UV-C Fixtures carefully to avoid damage to components, enclosures and finish. Do not install any damaged components; instead replace them and return damaged components to equipment manufacturer.
- B. Comply with manufacturers' installation instructions and drawings regarding fixture placement for proper energy distribution fixture placement for proper energy distribution.

1.7 PROJECT CONDITIONS

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

1.8 WARRANTY

- A. UV-C Fixtures shall be warranted to be free from defects in material and workmanship for a operation period of 1 year or 18 months from shipment, whichever occurs first.
- B. Lamps shall provide the intensity needed to meet or exceed the specified inactivation rates for a minimum of 9000 hours of continuous operation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, acceptable manufacturers:
 1. Lumalier
 2. Evergreen UV
- B. Substitutions: As approved

2.2 Design Requirements

- A. Air Stream Disinfection

UV-C HERMICIDAL IRRADIATION SYSTEM
FOR HVAC EQUIPMENT AND DUCTWORK

1. AHU or Packaged Unit

- a. Irradiation – UV-C Germicidal Irradiation System is to be designed and installed in sufficient quantity perpendicular to the airflow inside the unit downstream of cooling coil so as to provide an optimum distribution of UV-C energy.
- b. When installed, the intensity penetrating the entire moving air stream will be sufficient to disinfect the target micro-organism, Influenza and Coronavirus at a rate as scheduled on drawings upon the first pass.

2. Supply or Return Ducts

- a. Irradiation – UV-C Germicidal Irradiation System is to be designed and installed in sufficient quantity perpendicular to the airflow inside the duct so as to provide an optimum distribution of UV-C energy.
- b. When installed, the intensity penetrating the entire moving air stream will be sufficient to disinfect the target micro-organism, Influenza and Coronavirus at a rate as scheduled on drawings upon the first pass.

2.3 UV-C Germicidal Irradiation System

- A. UV-C Germicidal Irradiation System shall consist of the UV-C Fixtures needed to meet the level of irradiance as scheduled on drawings.
- B. The manufacturer shall use computation modeling software for selecting the appropriate number of UV-C Fixtures for the UV-C Germicidal Irradiation System of each HVAC unit. The software shall produce tabular and graphical representation of UV-C disinfection modeling calculations, irradiation, and UV dosage calculations to determine fixture placement, energy distribution and projected disinfection rates of targeted pathogens.

2.4 UV-C Fixtures

- A. UV-C Fixtures shall be germicidal, high output, with factory assembled and tested housings and mounting structures. Each UV-C Fixture shall consist of a lamp, lamp socket(s), power supply and lamp wiring. Provide disconnect for 120 V power to the UV-C system located at the access door to the system.
- B. Power Supply:
 1. Power supply shall be of a high efficiency, high frequency, high power factor type with capability to operate with an input of 100-277VAC matched to the lamp and designed to maximize radiance and reliability.
 2. The power supply shall be protected from failure in the event of lamp failure and capable of operation indefinitely when powered with no lamp or failed lamp.
 3. The power supply shall be UL listed and designed for maximum UVC output and

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reliability.

4. The UV-C Fixture shall allow for installation of the power supplies in one of the following configurations:
 - a. In a drip proof enclosure inside the air handling unit, package unit or supply or return duct.
 - b. Within optional vertical or horizontal mounting struts inside the air handling unit, package unit or supply or return duct.
 - c. In a separate electrical enclosure outside the air handling unit, package unit or supply or return duct for indoor installations
 - d. Refer to the project details for mounting location
5. Lamp Sockets:
 - a. Sockets shall be constructed of UV-C resistant materials
 - b. The Lamp Socket shall accommodate a single ended four-pin UV-C lamp
 - c. Wires from the lamp socket to the power supply shall be coated with a Teflon-type UV resistant material and rated at 600 volts.
6. Lamp:
 - a. Lamp shall be a high output (nominal 825 800 milliamps), T-5 diameter, Compact Twin Tube bulb, hot cathode, low pressure UV-C lamp. Lamp tubes shall be constructed of Sodium Barium glass and internally coated, designed to extend lamp life and maintain output. Uncoated quartz lamp tubes shall not be acceptable.
 - b. Lamps shall be equipped with a four-pin lamp base.
 - c. When specified, lamps with UV-C transparent polymer sleeves shall be provided. Application of the polymer sleeve shall have the benefit of protecting the lamp and in the event of breakage, contain the glass and mercury for disposal.
7. Lamp life shall be a minimum of 9000 continuous hours of service.
 - a. The lamp shall produce no less than 80% of its initial UV-C output at end of useful life.
 - b. Manufacturer shall provide proof of testing data that shows lamp intensity at the end of useful lamp life.

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8. Each lamp shall contain no more than 5.0 milligrams of mercury.
9. Lamps shall produce 254 nm UV energy at up to 590 ft/min (180 m/min) air velocity in temperatures from of 45 deg. F (7 Deg. C) to 135 deg. F (57 Deg. C) without production of ozone.
 - a. Performance curves of the lamp at system operating temperatures and air velocity shall be available from the system manufacturer and provided upon request.

C. System Monitoring [OPTIONAL]

1. A dry contact output from the current sensor indicating a reduction in current of the UV-C system performance shall be available to connect to the BMS system. abrupt drop in performance indicating trouble with one of the UV-C system lights or ballasts.
2. The current sensor shall be installed on the outside surface of the AHU.
3. Current sensor shall meet the following criteria:
 - a. With dry contacts for connection to customer supplied BMS system
 - b. Adjustable trip point 2.00 to 20.00A
 - c. AC contact rating – Relay: 10A @240V
 - d. Max in Rush Current 300A

2.5 Execution

A. Installation Of Upper Air Fixture

1. Install UV -C lamp systems according to manufacturer's installation manual and drawings unless otherwise indicated
2. Install UV lamps in each UV -C lamp system.
3. Install UV -C lamp systems in locations that are accessible and that will permit servicing and maintenance.
4. Provide six feet (6fy) of wiring loom to facilitate lamp connection to a remotely located power supply and/or power supply housing, such that lamp and loom can be mounted anywhere in the system.
5. Identify UV -C lamp systems with equipment labels.
6. After installation, adjust UV -C lamp systems and supports to maximize exposure to surfaces, before energizing system.

B. Electrical Connections:

1. Provide electrical power and service disconnects to products requiring electrical connections.
2. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

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- C. Switches and Circuit Breakers:
 - 1. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems"
- D. Operational Test:
 - 1. After installing UV -C lamp systems, and after electrical circuitry has been energized, test units to confirm proper operation.
 - 2. Confirm proper operation of safety interlock power switches
- E. Cleaning
 - 1. Wipe lamps clean using manufacturers' recommended cleaning methods and materials.
- F. Demonstration
 - 1. Engage a factory -authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain UV -C lamp systems.

END OF SECTION

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SECTION 26 00 00

ELECTRICAL

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The following Summary of Work is intended as an aid to achieve an understanding of the various elements of work included in the project, as is not intended to be all-inclusive. Detailed descriptions of work and requirements are given in drawings and specifications.
- B. General Scope of Work:
 - 1. Providing overcurrent protection, wiring, conduits, disconnect, and junction boxes.

1.4 COORDINATION

- A. All electrical work shall be done under sub-contract to a General Contractor. Electrical Contractor shall coordinate all work through General Contractor, even in areas where only electrical work is to take place.
- B. Work shall take place with minimal disruption to Owner's operations in areas surrounding the scope of work area.
- C. Cooperate fully with other contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
- D. Fully coordinate with mechanical contractor for providing power to mechanical equipment.

1.5 UTILITIES – N/A

1.6 CONTRACTOR USE OF PREMISES

- A. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.
 - 1. Driveways and Entrances: Keep driveways and entrances serving the premises, clear and available to the Owner, the Owner's employees, and emergency vehicles at all time. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Site Safety: Take every precaution to ensure the site does not present a threat to the safety of occupants and/or workers. Minimal safety requirements include, but are not limited to the

following:

1. Yellow caution tape and construction barricades along open trenches during the day. Trenches shall be covered at night and warning lights provided on construction barricades.
2. Temporary fencing around equipment while site work is in progress.

1.7 SUBMITTALS

1. To expedite the submittal process more efficiently, do not piece-meal the submittals. Submit entire electrical in a bound enclosure. This will eliminate delays in the submittal process. Unbound submittals shall be returned without review. Submit 10 copies minimum.

END OF SECTION

SECTION 26 00 01

ELECTRICAL GENERAL REQUIREMENTS

PART1- GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions, Specification Sections and all relevant documents shall form a part of this Section of the Specifications, and shall be incorporated in this Section and each Section 260000 hereinafter as if repeated verbatim herein. All conditions imposed by these documents shall be applicable to all portions of the work under this Section. Certain specific paragraphs of said references may be referred to hereinafter in this Section. These references are intended to point out specific items to the Contractor, but in no way relieve him of the responsibility of reading and complying with all relevant parts of the entire Specification.
- B. The Contractor shall examine and coordinate with all Contract Drawings and Specifications, and all Addenda issued. Failure to comply shall not relieve him of responsibility. The omission of details of other portions of the work from this Section shall not be used as a basis for a request for additional compensation.
- C. The specific features and details for other portions of the work related to the construction in progress or to the adjacent building shall be determined by examination at the site.

1.2 SCOPE OF WORK

- A. The requirements contained in this Section apply to all work performed under these Specifications.
- B. The work covered by this Section of the Specifications comprises the furnishing of labor, material, equipment, transportation, tools and services, and performing operations required for, and reasonably incidental to, the installation of the work in accordance with the applicable Contract Documents, and subject to the terms and conditions of the Contract.
- C. Refer to other Sections of the Specifications for related work.

1.3 DEFINITION OF "CONTRACTOR"

- A. Where the word "Contractor" is used under any Section of this Section of the Specifications, it shall mean the Contractor engaged to execute the work included under that Section, even though this Contractor may be technically described as a Subcontractor, or an authorized representative.
- B. If the Contractor, engaged to execute a portion of the work, employs a Subcontractor to perform some of that work, he shall be completely responsible for the proper execution of this Subcontractor's work, in full conformity with the Contract Documents.

1.4 RESPONSIBILITY OF THE CONTRACTOR

- A. The Contractor shall be responsible for all work of every description in connection with this Section of the Specifications. The Contractor shall specifically and distinctly assume, and does zeso assume, all risk for damage or injury from whatever cause to property or person used or

employed on or in connection with this work and of all damages or injury to any person or property wherever located, resulting from an action or operation under the Contract in connection with the work, and undertake the responsibility to defend the Owner against all claims on account of any such damage or injury.

- B. The Contractor will be held responsible for the satisfactory execution and completion of the work in accordance with the true intent of the Contract Documents. The Contractor shall provide without extra charge all incidental items required as part of the work, even though it may not be specifically indicated. If the Contractor has reason for objecting to the use of any material, equipment, device or method of construction as indicated, the Contractor shall make report of such objections to the Owner's Representative, obtain proper approval and adjustment to the Contract, and shall proceed with the work.

1.5 TERMINOLOGY

- A. Whenever the words "furnish", "provide", "furnish and install", "provide and install", and similar phrases occur, it is the intent that the materials, equipment and devices described be furnished, installed and connected under this Section, complete for operation, unless specifically noted to the contrary.
- B. It is also the intent, unless specifically noted to the contrary, that all materials, equipment and devices described and specified under this Section of the Specifications be similarly furnished, installed and connected under this Section, whether or not a phrase as described in the preceding paragraph has been actually included.
- C. Whenever the words "Owner's Representative" occurs, it is intended to refer to the Engineer and/or specific Owner's Representative responsible for or capable of providing the necessary direction pertaining to the referenced issue.

1.6 ORDINANCES, PERMITS AND CODES

- A. It shall be the Contractor's duty to perform the work and provide the materials covered by these specifications in conformance with all ordinances and regulations of all authorities having jurisdiction.
- B. All work herein shall conform to all applicable laws, ordinances and regulations of the local utility companies.
- C. The Contractor shall obtain and pay for all permit and connection fees as required for the complete installation of the specified systems, equipment, devices and materials.
- D. The Contractor shall obtain permits, plan checks, inspections and approvals applicable to the work as required by the regulatory authorities. Fees and costs of any nature whatsoever incidental to these permits, inspections and approvals shall be assumed and paid by the Contractor. The pro-rata costs, if any, for utilities serving this property will be paid for by the Owner and shall not be included as part of this Contract.
- E. The work shall be in accordance with, but shall not be limited to, the requirements of:
 - 1 National Fire Protection Association
 - 2 National Electrical Code
 - 3 National Safety Code
 - 4 State of Texas Safety Code
 - 5 Local City Building Codes

6 State of Texas Building Codes

- F. Codes and standards referred to are minimum standards. Where the requirements of the Drawings or Specifications exceed those of the codes and regulations, the Drawings and Specifications govern.

1.7 MATERIALS, EQUIPMENT AND DEVICE DESCRIPTION

- A. Materials, equipment and devices shall be of the best quality customarily applied in quality commercial practice, and shall be the products of reputable manufacturers. Each major component shall bear a nameplate giving the name and address of the manufacturer, and the catalog number or designation of the component.
- B. Materials, equipment and devices furnished under this Section of the Specifications shall be essentially the standard product of the specified manufacturer, or where allowed, an alternate manufacturer. Where two or more units of the same kind or class of a specific item are required, these shall be the products of a single manufacturer; however, the component parts of the item need not be the products of one manufacturer.
- C. In describing the various materials, equipment and devices, in general each item will be described singularly, even though there may be a multiplicity of identical items. Also, where the description is only general in nature, exact sizes, duties, space arrangements, horsepower requirements and other data shall be determined by reference to the Contract Documents.
- D. Space allocations for materials, equipment and devices have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. The Contractor shall verify that all materials, equipment and devices proposed for use on this project are within the constraints of the allocated space.

1.8 QUALITY ASSURANCE

- A. Materials, equipment and devices shall be new and of the quality specified, and shall be free from defects at the time of installation. Materials, equipment and devices damaged in shipment or otherwise damaged or found defective prior to acceptance by the Owner shall not be repaired at the job site, but shall be replaced with new materials, equipment or devices identical with those damaged, unless specifically approved otherwise by the Owner's Representative.
- B. Wherever a UL standard has been established for a particular type of material, equipment or device, each item of such material, equipment or device provided on this project shall meet the requirements of the UL standard in every way, and shall be UL listed and labeled.

1.9 REFERENCE STANDARDS

- A. Materials, equipment, devices and workmanship shall comply with applicable local, county, state and national codes, laws and ordinances, utility company regulations and industry standards.
- B. In case of differences between building codes, state laws, local ordinances, industry standards, utility company regulations and the Contract Documents, the most stringent shall govern. The Contractor shall promptly notify the Owner's Representative in writing of any such difference. Should the Contractor perform any work that does not comply with local codes, laws and ordinances, industry standards or other governing regulations, the work shall be corrected of

noncompliance deficiencies with the Contractor bearing all costs.

C. In addition to the aforementioned ordinances, industry standards published by the following organizations shall apply:

AABM	-	American Association of Battery Manufacturers
ADA	-	American's with Disabilities Act
AIA	-	American Institute of Architects
ANSI	-	American National Standards Institute
ASTM	-	American Society for Testing and Materials
CBM	-	Certified Ballast Manufacturers Association
ETL	-	Electrical Testing Laboratories
FM	-	Factory Mutual
ICEA	-	Insulated Cable Engineers Associated
IEEE	-	Institute of Electrical and Electronic Engineers
IES	-	Illuminating Engineering Society
IRI	-	Industrial Risk Insurance
NBS	-	National Bureau of Standards
NEC	-	National Electrical Code
NECA	-	National Electrical Contractors Association
NEMA	-	National Electrical Manufacturers Association
NESC	-	National Electrical Safety Code
NETA	-	National Electrical Testing Association
NFPA	-	National Fire Protection Association
UL	-	Underwriters Laboratories

1.10 DRAWINGS AND SPECIFICATIONS

- A. The interrelation of the Drawings (including the schedules) and the Specifications are as follows:
- 1 The Drawings establish quantities, locations, dimensions and details of materials, equipment and devices. The schedules on the Drawings indicate the capacities, characteristics and components.
 - 2 The Specifications provide written requirements for the quality, standard and nature of the materials, equipment, devices and construction systems.
- B. The Drawings and Specifications shall be considered as being compatible; therefore, the work called for by one and not by the other shall be furnished and installed as though called for by both. Resolution of conflicts between Drawings and Specifications shall be as follows:
- 1 If the Drawings and Specifications disagree in themselves, or with each other, the Contractor's pricing shall be based on furnishing and installing the most expensive combination of quality and quantity of work indicated for a complete operable system.

Contractor is responsible to notifying the Engineer. In the event of this type of disagreement, the resolution shall be determined by the Owner's Representative. The contractor shall assume for an operable system at the most expensive combination as per the latest National Electrical Code. The contractor shall review all drawings and specifications prior to bid date.

- 2 The Contractor shall be responsible for bringing any conflicts in the Drawings and the Specifications to the attention of the Owner's Representative immediately, prior to bid date.
 - 3 In general, if there is conflict between the Drawings and Specifications, the Drawings shall govern the Specifications.
 - 4 Where the Specifications do not fully agree with schedules on the Drawings, the schedules shall govern. Actual numerical dimensions indicated on the Drawings govern scale measurements and large scale details govern small scale drawings.
 - 5 Materials, equipment and devices called for on the Drawings and not indicated herein, shall be completely provided and installed as though it were fully described herein.
 - 6 Materials, equipment and devices called for herein shall be completely provided and installed, whether or not it is fully detailed, scheduled or indicated on the Drawings.
- C. The Contractor shall examine the Drawings and Specifications of the other portions of the work for fixtures and finishes in connection with this work. The Contractor shall carefully examine the Drawings to determine the general construction conditions, and shall familiarize himself with all limitations caused by such conditions.
- D. When discrepancies exist between scale and dimension, or between the Drawings of the various portions of the work, they shall be called to the attention of the Owner's Representative for further instruction, whose instructions shall be final and binding and work promptly resumed without any additional cost to the Owner.
- E. Review the construction details of the building(s) as illustrated on the Drawings of the other portions of the work, i.e., engineering, structural, civil, landscape, etc., and be guided thereby. Route conduits and set all boxes as required by the pace of the general construction.
- F. The Drawings diagrammatically show the sizes and locations of the various equipment and devices, and the sizes of the major interconnecting wires, without showing exact details as to elevations, offsets, control wiring and other installation requirements. Carefully layout the work at the site to conform to the engineering and structural conditions, to avoid obstructions and to permit proper grading of pipe associated with other portions of the work. In cooperation with other Contractors, determine the exact location of equipment and devices and connections thereto by reference to the submittals and rough-in drawings, and by measurements at the site. Make minor relocations necessitated by the conditions at the site, or directed by the Owner's Representative, without additional cost to the Owner.
- G. The Drawings and Specifications are intended to describe and illustrate systems which will not interfere with the structure of the building(s), fit into the available spaces, and insure complete and satisfactory operating installations. Prepare installation drawings as required for all critical areas illustrating the installation of the work in this Section as related to the work of all other Sections and correct all interferences with the other portions of the work or with the building structures before the work proceeds.

- H. The Drawings do not indicate the existing electrical installations other than to identify modifications or extensions thereto. Visit the site and ascertain the conditions to be met and the work to be accomplished in removing and modifying the existing work, and in installing the new work. Failure to comply with this shall not constitute grounds for any additional payment in connection with removing or modifying any part of the existing installation or installing any new or temporary work under this Section.

1.11 SUBMITTALS

- A. Submit product data and shop drawings in accordance with the Specifications.
- B. Process product data and shop drawings to insure that the proposed materials, equipment and devices conform to the requirements of the Contract Documents, and that there are no omissions or duplications. Provide layouts, fabrication information and data for systems, materials, equipment and devices proposed for the project.
- C. Submittals shall be provided for review and approval on all systems, equipment, devices and materials proposed for use on this project. Submittals shall include, but not be limited to, the following:
- 1 Lighting and Appliance Panelboards
 - 2 Disconnect Switches
 - 3 Circuit Breakers and Fuses
 - 4 Materials: conduit, conductors, connectors, supports, etc.
 - 5 Lighting Fixtures, Lamps and Control Systems/Devices
 - 6 Wiring Devices
 - 7 Transformers
 - 8 Distribution Panelboards
 - 9 Motor Control Center
 - 10 As indicated on each submittal section
- D. The product data shall not consist of manufacturer's catalogs or cut sheets that contain no indication of the exact item offered. The submission on individual items shall designate the exact item offered.
- E. Do not submit detailed quantitative listings of materials, equipment and devices. It is the Contractor's responsibility to provide proper sizes and quantities to conform to Contract Documents.
- F. Assemble submittals on related items procured from a single manufacturer in bound brochures or other suitable package form, rather than submitting a multiplicity of loose sheets.
- G. Prepare shop drawings whenever equipment proposed varies in physical size and arrangement from that indicated thus causing rearrangement of equipment space, where tight spaces require extreme coordination between this work and other work, where called for elsewhere in these Specifications and where specifically requested by the Owner's Representative. Shop drawings shall be prepared at a scale of not less than 1/4 inch equals 1 foot.
- H. The Contractor shall sign the submittal as an indication of compliance with the Contract Documents. If there are any deviations from the Contract Documents, he shall so indicate on the submittal. Any deviations not so indicated shall be cause for rejection and removal of the non-complying equipment at the Contractor's expense.

1.12 SUBSTITUTIONS

- A. Where a single manufacturer is mentioned by trade name or manufacturer's name, unless specifically noted otherwise, it is the only manufacturer that will be accepted.
- B. Where multiple manufacturers are listed, none other than those manufacturers will be accepted.
- C. Manufacturers not listed will be considered for substitution prior to bid only. The substitute manufacturer shall submit a complete copy of the appropriate technical specification section minimum seven (7) business days prior to bid with each sub-paragraph noted with the comment, "compliance", "deviation", "alternate" or "not applicable". In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.
 - 1 By noting the term "compliance" or "C", it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
 - 2 By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.
 - 3 By noting the term "alternate" or "A", it shall be understood that the manufacturer proposes to provide the same operating function but prefers to do it in a different manner. An alternate shall be fully described as to what the manufacturer proposes to provide.
 - 4 By noting the term "not applicable" or "N/A", it shall be understood that the specified item is not applicable to the project.
- D. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal 1/4 inch equals 1 foot scaled drawings showing that the substitute can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.
- E. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner's Representative, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other portions of the work in connection with the substituted equipment or device.
- F. The Owner's Representative reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.
- G. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal

of substitutions for the same item will not be considered.

1.13 INSTALLATION DRAWINGS

- A. Prepare installation drawings for coordinating the work of this Section with the work of other Sections, to illustrate its concealment in finished spaces, to avoid obstructions, and to demonstrate the adaptability of any item of material, equipment or device in the space upon which the Contract Documents are based.
- B. Use these drawings in the field for the actual installation of this work. Provide three (3) copies, not for approval, to the Owner's Representative for his information, review and record.

1.14 WORKMANSHIP AND INSTALLATION

- A. In no case shall the Contractor provide a class of material, equipment, device or workmanship less than that required by the Contract Documents or applicable codes, regulations, ordinances or standards. All modifications which may be required by a local authority having legal jurisdiction over all or any part of the work shall be made by the Contractor without any additional charge. In all cases where such authority requires deviations from the requirements of the Drawings or Specifications, the Contractor shall report same to the Owner's Representative and shall secure his approval before the work is started.
- B. The work shall be performed by properly licensed technicians skilled in their respective trades. All materials, equipment and devices shall be installed in accordance with the recommendations of the manufacturer and in the best standard practice to bring about results of a first class condition.
- C. The NECA "Standards of Installation" as published by the National Electrical Contractors Association shall be considered a part of these Specifications, except as specifically modified by other provisions contained in these Specifications.

1.15 INSPECTION OF SITE

- A. The accompanying drawings do not indicate existing installations other than to identify modifications of and extensions thereto. The Contractor shall visit the site, inspect the installations and ascertain the conditions to be met and the work to be performed. Failure to comply with this shall not constitute ground for any additional payments in connection with removing or modifying any part of the existing installations and/or installing any new work under this Section.
- B. Review construction details of the adjacent building presently under construction during the site inspection and include all work required to modify the existing installations and install new materials, comprising a part of the installation. Review all construction details of the new building as illustrated on the drawings and be guided thereby.

1.16 WARRANTY

- A. All materials, equipment, devices and workmanship shall be warranted for a period of one year from the date of acceptance by the Owner's Representative for beneficial use by the Owner, except that where specific equipment is noted to have extended warranties. The warranty shall be in accordance with AIA Document A201. The Contractor shall be responsible for the proper registration of these warranties so that the Owner can make all proper claims should future need develop.
- B. The Contractor shall furnish to the Owner's Representative for transmittal to the Owner, the

name, address and telephone number of those persons responsible for service on systems and equipment covered by the warranty.

1.17 OPERATION PRIOR TO ACCEPTANCE

- A. When any equipment is operable, and it is to the advantage of the Contractor to operate the equipment, the Contractor may do so provided that he properly supervises the operation, and retains full responsibility for the equipment operated. Regardless of whether or not the equipment has or has not been operated, the Contractor shall clean the equipment properly, make required adjustments and complete punch list items before final acceptance by the Owner.

1.18 INSTRUCTION OF OWNER'S PERSONNEL

- A. Provide the services of competent engineers and/or technicians acceptable to the Owner's Representative to instruct other representatives of the Owner in the complete and detailed operation of each item of equipment or device of all the various electrical systems. These instructions shall be provided for whatever periods may be necessary to accomplish the desired results. Upon completion of these instructions, the Contractor shall obtain a letter of release, acknowledged by the Owner or his authorized representative, stating the dates on which the various kinds of instruction were given, and the personnel to whom the instructions were given.
- B. The Contractor shall be fully responsible for proper maintenance of equipment and systems until the instructions have been given to the Owner's personnel and the letter of release acknowledged.
- C. In providing the instructions to the Owner's personnel, the written operating and maintenance manuals shall be followed in all instances, and the Owner's personnel shall be familiarized with such manuals. Operating and maintenance manuals used for instructions shall include wiring diagrams, manufacturer's operating and maintenance instructions, parts lists (with sources identified), and other data as appropriate for each system.

1.19 SCHEDULE AND SEQUENCE OF WORK

- A. The Contractor shall meet and cooperate with the Owner and Owner's Representative to schedule and sequence this work so as to insure meeting scheduled completion dates and avoid delaying other portions of the work. Work requiring special sequencing shall be at no additional cost to the Owner and shall have no impact on the schedule.

1.20 INSTALLATION INSPECTIONS AND CERTIFICATIONS

- A. Obtain timely inspections of the installation by the regulatory authorities. Remedy any deficiencies to the satisfaction of the inspecting official.
- B. Upon final completion of the work, obtain certificates of acceptance from the regulatory authorities. Deliver the certificates to the Owner's Representative for transmission to the Owner.

1.21 EQUIPMENT INSTALLATION

- A. Install equipment and devices in a manner to permit access to all surfaces or components, requiring such access, without the need to disassemble other unrelated parts of the work.
- B. Equipment specified to be factory assembled and tested prior to shipment shall not be

disassembled at the job site and reassembled at its final location. Apparatus not so specified may be disassembled and reassembled in the proper location.

- C. Furnish all scaffolding, rigging and hoisting required for the installation of all the work.

1.22 CONCRETE HOUSEKEEPING PADS

- A. Concrete housekeeping pads shall be provided for all floor mounted equipment, unless noted or required otherwise.
- B. All pads shall be not less than 3-1/2" high and extend a maximum 3" beyond the actual equipment size. Coordinate the proper size of the pad with the equipment furnished. Pads shall be poured in forms built of new dressed lumber with corners chamfered using sheet metal or triangular wood strips nailed to the form. Use 6 x 6 No. 3 mesh for reinforcing. Install heavy duty adjustable anchor bolts, set in the form and positioned using templates, prior to pouring concrete. After the equipment is set on the pad, the equipment shall be aligned, leveled and fully grouted to the pad and all void spaces shall be filled with a non-shrinking grout.
- C. Perform all concrete work specified to be provided under this Section in strict accordance with the applicable provisions of Section, CONCRETE.

1.23 SLEEVES

- A. Each conduit, regardless of material, which passes through a concrete slab, masonry wall, or roof or portion of the building structure shall be free from the structure and shall pass through a sleeve.
- B. All sleeves shall be constructed from electrical-metallic tubing or equivalent weight galvanized steel tubing and shall be flush on both sides of the surface penetrated, unless noted otherwise. All sleeves penetrating the roof areas shall extend a minimum 10 inches above the roof with approved weatherproof counterflashing attached to the conduit above the roof. All sleeves penetrating floors shall extend a minimum of 6 inches above the finished floors. The sleeves shall be sized to allow free passage of the conduit to be inserted.
- C. Sleeves passing through walls or floors on or below grade or in moist areas shall be constructed of galvanized rigid steel and shall be designed with a suitable flange in the center to form a waterproof passage. After the conduit has been installed in the sleeves, the void space around the conduit shall be caulked and filled with an asphalt-base compound to insure a waterproof penetration. Jute twine caulking shall not be used due to susceptibility to termite infestation.

1.24 ESCUTCHEONS

- A. In each finished space, provide a chromium plated, sectional escutcheon on each conduit, or hanger rod penetrating a wall, floor or ceiling.
- B. Size escutcheons and collars to fit snugly around conduit and rods.
- C. Where required, provide escutcheons with set screws so that they fit snugly against the finished surface.

1.25 ACCESS PANELS

- A. Provide wall and ceiling access panels for unrestricted access to all concealed electrical equipment items and devices installed behind furrings, chases or non-removable suspended ceilings.
- B. Access panels shall be UL listed and labeled as required to suit the fire rating of the surface in which installed, with mounting straps, concealed hinges, screwdriver locks, 180 degree open

door design, 16 gauge steel construction and door and frame finished in prime coat finish. Panels shall be 12-inch by 12-inch minimum size, but shall be larger as the access requirement of the concealed electrical equipment item or device increases.

1.26 SEALING OF PENETRATIONS

- A. All penetrations in horizontal or vertical fire-rated construction shall be sealed using approved fire-rated sealing materials equivalent to the following:
 - 1 Foam: Dow Corning 3-6548 RTV silicone foam, liquid component Part 4 (black) and liquid component Part B (off-white).
 - 2 Sealant: Dow Corning 96-081 RTV silicone adhesive sealant.
 - 3 Damming Materials: Mineral fiberboard, mineral fiber matting, mineral fiber putty, plywood or particle board, as selected by applicator.
- B. Preparation: Remove combustible materials and loose impediments from penetration opening and involved surfaces. Remove free liquid and oil from penetration surfaces.
- C. Installation: In accordance with manufacturer's instructions, install damming materials and sealant to cover and seal penetration openings; inject foam mixtures into openings.
- D. In addition to the Dow Corning products, equal products by Spec Seal Firestop Products, 3M Fire Barrier or CS240 Firestop are acceptable.

1.27 PROTECTION OF APPARATUS

- A. At all times take every precaution to properly protect apparatus from damage due to dust, dirt, water, etc. or from damage due to physical forces. Include the erection of temporary shelters as required, to adequately protect any apparatus stored at the site, the cribbing of any apparatus directly above the construction, and the covering of apparatus in the incomplete building with tarpaulins or other protective covering. Failure on the part of the Contractor to comply with the above to the entire satisfaction of the Owner's Representative will be sufficient cause for the rejection of the pieces of apparatus in question.
- B. Responsibility for the protection of apparatus extend also to existing apparatus involved in this Section of the work, whether such apparatus is designated to be used temporarily and later removed, or is to be reused as a part of the permanent installation. Erect temporary sheltering structures, provide temporary bracing and supports, or cover equipment as required or directed to afford proper protection for that equipment.
- C. The Contractor shall protect this work and the work of all other Contractors from damage by his work or workmen and shall make good any damage thus caused. He shall also be responsible for the proper protection of his equipment, machinery, materials and accessories delivered and installed on the job.

1.28 INSTALLATION OF CONTROL AND OPERATING DEVICES

- A. The highest operable part of controls (light switches, dimmer switches, emergency power off devices, etc.), receptacles (electrical and communications) and other operable devices shall be 48" above finish floor. The lowest operable part shall be no less than 15" above finished floor. For purposes of uniformity, unless noted otherwise, the top of a device shall be maximum 48" AFF and the bottom of a device shall be minimum 15" AFF. Refer to the electrical symbols list on the Drawings for specific requirements.
- B. Visual alarm appliances shall be placed 80" above finished floor (the highest floor level within a

space) or 6" below the ceiling, whichever is lower.

1.29 INSTALLATION AND CONNECTION OF OTHER SECTION'S EQUIPMENT

- A. Verify the electrical requirements of all equipment furnished under other Sections, separate contracts, or by the Owner. Install conduit, power wiring, control wiring, devices, etc. as required for complete operation of all equipment.

1.30 OPTION TO RELOCATE OUTLETS AND RELATED DEVICES

- A. The location of power, data and telephone outlets, wall switches and other related devices may be relocated at the Owner's option, at no additional cost to the Owner, to a point within 10 feet of their present location provided the Contractor is notified prior to installation.

1.31 COOPERATION AND CLEAN-UP

- A. It shall be the responsibility of the Contractor to cooperate fully to keep the job site in a clean and safe condition. Upon the Contractor shall immediately remove all of his tools, equipment, surplus materials and debris.
- B. After the installation is complete and before the equipment is energized, clean the interior and exterior of all equipment thoroughly. Clean equipment, removing all debris, rubbish and foreign materials. Each component shall be cleaned and all dust and other foreign material. Components shall be cleaned of oxidation. The inside and outside of all switchgear shall also be wiped clean with lemon-oil rag after all other cleaning is complete. Any portion of the work requiring touch-up finishing shall be so finished to equal the specified finish on the product.

1.32 RECORD DRAWINGS AND DOCUMENTATION FOR OWNER

- A. The Contractor shall obtain at his own expense a complete set of blue-line prints on which to keep an accurate record of the installation of all materials, equipment and devices covered by the Contract. The Contractor shall record up to date information at least once a week and retain the set of prints on site for periodic review by the Engineer. The record drawings shall indicate the location of all equipment and devices, and the routing of all systems. If the Contractor prepared large scale installation drawings of electrical rooms, conduit routing, busduct, routing, etc., these drawings or reproducible copies thereof shall be revised as required to accurately illustrate the actual installation. All conduit buried in concrete slabs, walls and below grade shall be located by dimension; both horizontally and by vertical elevation, unless a surface mounted device in each space indicates the exact location.
- B. Upon anticipated completion of the job, obtain one complete reproducible set of the original drawings on which to neatly, legibly and accurately transfer all project related notations and deliver these record drawings to the Engineer at job completion before final payment and delivery to the Owner. This information shall be delivered prior to final acceptance.
- C. The Contractor shall accumulate in duplicate during the job progress, the following data prepared in indexed 3-ring looseleaf, hard-back binders sized for 8-1/2 inch by 11 inch sheets. No binder shall exceed 3-1/2 inches thick. This data shall be turned over to the Owner's Representative for review and subsequent delivery to the Owner prior to final acceptance.
 - 1 Warranties, guarantees and manufacturer's directions on material, equipment and devices covered by the Contract.
 - 2 Approved lighting fixture brochures, wiring diagrams and control diagrams.

- 3 Copies of approved submittals and shop drawings.
- 4 Operating instructions and recommended maintenance procedures for major apparatus.
- 5 Copies of all other data and/or drawings required during construction.
- 6 Repair parts list of major apparatus, including name, address and telephone number of local supplier or representative.
- 7 Tag charts and diagrams hereinbefore specified.

1.33 FINAL OBSERVATION

- A. The purpose of the final observation is to determine whether the Contractor has completed the construction in accordance with the Contract Documents and that in the Owner Representative's opinion the installation is satisfactory for final acceptance by the Owner.
- B. It shall be the responsibility of the Contractor to assure that the installation is ready for final acceptance prior to calling upon the Owner's Representative to make a final observation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTOR AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Specification Sections, 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.
- B. Comply with NFPA 70.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wires and cables according to NEMA WC 26.

1.6 COORDINATION

- A. Coordinate layout and installation of cables with other installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. 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. BICC Brand-Rex Company.
 - c. Carol Cable Co., Inc.
 - d. Senator Wire & Cable Company.
 - e. 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. Rubber Insulation Material: Comply with NEMA WC 3.
- C. Thermoplastic Insulation Material: Comply with NEMA WC 5.
- D. Ethylene Propylene Rubber Insulation Material: Comply with NEMA WC 8.
- E. Conductor Material: Copper.
- F. Stranding: Solid conductor for No. 10 AWG and smaller; stranded conductor for larger than No. 10 AWG.
- G. Plenum rated cable for all cables above the ceiling.

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. Feeders: Type 75C insulation THHN/THWN, in raceway.
- B. Branch Circuits: Type THHN/THWN, in raceway.
- C. Class 1 Control Circuits: Type THHN/THWN, in raceway.
- D. Class 2 Control Circuits: Type THHN/THWN, in raceway.
- E. Equipment or any device rated 100 amperes or less, conductor shall be rated 60C as per National Electrical Code.
- F. Equipment or any device rated over 100 amperes, conductor shall be rated 75C as per National Electrical Code.

3.3 INSTALLATION

- A. Install wires and cables as indicated, according to manufacturer's written instructions and NECA's "Standard of Installation."
- B. Remove existing wires from raceway before pulling in new wires and cables.
- C. 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.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables, parallel and perpendicular to surfaces of exposed structural members,

and follow surface contours where possible.

- F. Support cables according to Section "Basic Electrical Materials and Methods."
- G. Seal around cables penetrating fire-rated elements according to Section "Firestopping."
- H. Identify wires and cables according to Section "Basic Electrical Materials and Methods."
- I. Identify wires and cables according to Section "Electrical Identification."

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. Use oxide inhibitor in each splice and tap connector for aluminum conductors.
- E. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches (300 mm) of slack.
- F. Connect outlets and components to wiring and to ground as indicated and instructed by manufacturer.
- G. 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

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grounding and bonding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.
- B. Related Sections include the following:
 - 1. List below only products, construction, and equipment that the reader might expect to find in this Section but are specified elsewhere.
 - 2. Section "Underground Ducts and Utility Structures" for ground test wells.

1.3 SUBMITTALS

- A. Revise this Article to suit Project and office practice. Frequently, no product submittal is required for this Section.
- B. Product Data: For each type of product indicated.

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.
 - 1. Comply with UL 467.
- B. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.
- C. Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Grounding Conductors, Cables, Connectors, and Rods:
 - a. Apache Grounding/Erico Inc.
 - b. Boggs, Inc.
 - c. Chance/Hubbell.
 - d. Copperweld Corp.

- e. Dossert Corp.
- f. Erico Inc.; Electrical Products Group.
- g. Framatome Connectors/Burndy Electrical.
- h. Galvan Industries, Inc.
- i. Hastings Fiber Glass Products, Inc.
- j. Ideal Industries, Inc.
- k. ILSCO.
- l. Kearney/Cooper Power Systems.
- m. Korns: C. C. Korns Co.; Division of Robroy Industries.
- n. Lightning Master Corp.
- o. Lyncole XIT Grounding.
- p. O-Z/Gedney Co.; a business of the EGS Electrical Group.
- q. Raco, Inc.; Division of Hubbell.
- r. Robbins Lightning, Inc.
- s. Salisbury: W. H. Salisbury & Co.
- t. Superior Grounding Systems, Inc.
- u. Thomas & Betts, Electrical.

2.2 GROUNDING CONDUCTORS

- A. For insulated conductors, comply with Section "Conductors and Cables."
- B. Material: copper.
- C. Equipment Grounding Conductors: Insulated with green-colored insulation.
- D. Grounding Electrode Conductors: Stranded cable.
- E. Sizes and types below are typical. Adjust to suit Project conditions and requirements.
- F. Copper Bonding Conductors: As follows:
 - 1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.
 - 2. Bonding Conductor: No. 4 or No. 6 AWG, stranded copper conductor.
 - 3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.
 - 4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

2.3 CONNECTOR PRODUCTS

- A. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.
- B. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Use only copper conductors for both insulated and bare grounding conductors in direct contact with earth, concrete, masonry, crushed stone, and similar materials.
- B. In raceways, use insulated equipment grounding conductors.
- C. Equipment Grounding Conductor Terminations: Use bolted pressure clamps.

3.2 EQUIPMENT GROUNDING CONDUCTORS

- ### 3.3 INSTALLATION

- ### 3.4 CONNECTIONS

- ## GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- C. Equipment Grounding Conductor 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: If 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 entrances and exits with grounding bushings and bare grounding conductors, unless otherwise indicated.
- 3.5 FIELD QUALITY CONTROL
- A. Testing: Perform the following field quality-control testing:
 - 1. After installing grounding system but before permanent electrical circuitry has been energized, test for compliance with requirements.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

- A. The General Provisions, Supplemental General Provisions, Special Provisions and Specification sections, apply to work covered by this Section.
- B. Comply with this sections, as applicable. Refer to other sections for coordination of work.

1.2 SCOPE OF WORK

- A. Provide labor, material, equipment, tools and services, and perform operations required for, and reasonably incidental to, the providing of supporting devices, including related systems and accessories.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Unistrut Corp.
- B. B-Line Systems, Inc.
- C. Midland Ross-Kindorf

2.2 MATERIALS

- A. Suspension Hangers
 - 1. Suspension hangers for individual conduit runs shall be zinc plated formed steel type.
- B. Vertical Supports
 - 1. Malleable iron one hole pipe straps shall be used for vertical runs
- C. Clamps
 - 1. Beam clamps shall be used for bar joists and beams.
- D. Anti-Vibration Hangers
 - 1. Anti-vibration hangers shall be combination type having a double deflection neoprene element in series with a steel coil spring; double deflection of 0.30"; steel coil spring shall be selected from a 1" static deflection series with a minimum additional travel to solid of ½"; spring diameters shall be large enough to permit 15 degree angular misalignment of the rod connecting the hanger to the ceiling support without rubbing the hanger box.

2.3 LIGHT FIXTURE HANGERS

- A. Refer to Section 26 51 00
- B. Corrosive Areas: PVC; at factory apply a minimum of 10-mil-thick PVC coating, bonded to metal, inside and outside.Z

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hangers

1. Approved hangers and stiff leg supports shall be installed in quantity and size as required to carry the weight of raceway and contents and shall be arranged to prevent vibration transmission to the building and allow for raceway movement.
2. Hangers shall be supported by means of uncoated solid steel rods which are threaded to allow vertical adjustments. Lock nuts shall be provided in sufficient number and location to lock all rod adjustments permanently at the adjusted height. Two lock nuts shall be used unless the nut tightens against a threaded socket. Minimum rod diameters shall be as follows:

B. NOMINAL CONDUIT SIZE	ROD DIAMETER
--------------------------------	---------------------

1/2" through 2"	1/4"
2-1/2" through 3"	3/8"
4" and 5"	1/2"

1. Hanger spacing shall be as required for proper and adequate support raceway, but in no case shall be less than one hanger per 8'-0" of raceway length except that conduit less than 1" diameter shall be supported at least every 6'-0".
2. Where numerous conduits are run parallel to one another, they may be supported from a trapeze type hanger arrangement with strut bottom.
3. Anti-vibration type hangers shall be provided for equipment as required to minimize vibration and/or as directed by the Architect/Engineer.

Supports

4. Support of hangers shall be by means of sufficient quantities of individual after set steel expansion shields, or beam clamps attached to structural steel.
5. Stiff-legs shall be furnished and installed in cases where support from overhead structure is not possible.
6. Ceiling mounted lighting fixtures shall be supported from the building structure at two opposite corners. The Contractor shall provide fixture hangers to properly interface with the ceiling system.
7. Furnish and install complete any additional structural support steel, brackets, fasteners, etc., as required to adequately support all raceway and equipment.
8. Support of hangers from concrete slabs shall be by means of sufficient quantity of "U" brackets attached with after set expansion shields and bolts.
9. Support of hangers from concrete tees shall be by means of sufficient quantity of angle iron brackets attached with after set expansion shields and bolts.

END OF SECTION

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
 - 1. Edit lists below to suit Project.
 - 2. Raceways include the following:
 - a. RMC.
 - b. IMC.
 - c. PVC externally coated, rigid steel conduits.
 - d. PVC externally coated, IMC.
 - e. EMT.
 - f. FMC.
 - g. LFMC.
 - h. LFNC.
 - i. RNC.
 - j. ENT.
 - k. Wireways.
 - l. Surface raceways.
 - 3. Boxes, enclosures, and cabinets include the following:
 - a. Device boxes.
 - b. Floor boxes.
 - c. Outlet boxes.
 - d. Pull and junction boxes.
 - e. Cabinets and hinged-cover enclosures.
- B. Related Sections include the following:
 - 1. List below only products and equipment for this Project that the reader might expect to find in this Section but are specified elsewhere. Verify that Section titles listed below are correct for this Project's Specifications because Section titles may have changed since this Section was updated.
 - 2. Section "Basic Electrical Materials and Methods" for raceways and box supports.
 - 3. Section "Wiring Devices" for devices installed in boxes and for floor-box service fittings.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. ENT: Electrical nonmetallic tubing.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. RMC: Rigid metal conduit.

H. RNC: Rigid nonmetallic conduit.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Delete below except for custom enclosures.
- C. Shop Drawings: Include layout drawings showing components and wiring for nonstandard boxes, enclosures, and cabinets.

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. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Metal Conduit and Tubing:
 - a. Alflec Corp.
 - b. Anamet, Inc.; Anaconda Metal Hose.
 - c. Anixter Brothers, Inc.
 - d. Carol Cable Co., Inc.
 - e. Cole-Flex Corp.
 - f. Electri-Flex Co.
 - g. Flexcon, Inc.; Coleman Cable Systems, Inc.
 - h. Grinnell Co.; Allied Tube and Conduit Div.
 - i. Monogram Co.; AFC.
 - j. Spiraduct, Inc.
 - k. Triangle PWC, Inc.
 - l. Wheatland Tube Co.
 - 2. Nonmetallic Conduit and Tubing:
 - a. Anamet, Inc.; Anaconda Metal Hose.
 - b. Arnco Corp.
 - c. Breeze-Illinois, Inc.
 - d. Cantex Industries; Harsco Corp.
 - e. Certainteed Corp.; Pipe & Plastics Group.

- f. Cole-Flex Corp.
 - g. Condux International; Electrical Products.
 - h. Electri-Flex Co.
 - i. George-Ingraham Corp.
 - j. Hubbell, Inc.; Raco, Inc.
 - k. Lamson & Sessions; Carlon Electrical Products.
 - l. R&G Sloan Manufacturing Co., Inc.
 - m. Spiraduct, Inc.
 - n. 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. Hoffman Engineering Co.
 - b. Keystone/Rees, Inc.
 - c. Square D Co.
- 2.2 METAL CONDUIT AND TUBING
- A. Rigid Steel Conduit: ANSI C80.1.
 - B. Rigid Aluminum Conduit: ANSI C80.5.
 - C. IMC: ANSI C80.6.
 - D. EMT and Fittings: ANSI C80.3.
 - 1. Fittings: Set-screw type.
 - E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.
- 2.3 NONMETALLIC CONDUIT AND TUBING
- A. RNC: NEMA TC 2, Schedule 40 or 80 PVC.
 - B. RNC Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.
 - C. LFNC: UL 1660.
- 2.4 METAL WIREWAYS
- A. Material: Sheet metal sized and shaped as indicated.
 - 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. Select 1 of 4 paragraphs below.
 - E. Wireway Covers: Screw – cover type flanged-and-gasketed type.
 - F. Finish: Manufacturer's standard enamel finish.
- 2.5 OUTLET AND DEVICE BOXES
- A. Sheet Metal Boxes: NEMA OS 1.

- B. Aluminum is also available and suitable for use with steel raceways.
- C. Cast-Metal Boxes: NEMA FB 1, Type FD, cast box with gasketed cover.
- 2.6 PULL AND JUNCTION BOXES
 - A. Small Sheet Metal Boxes: NEMA OS 1.
 - B. Cast-Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- 2.7 ENCLOSURES AND CABINETS
 - A. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous hinge cover and flush latch.
 - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - 2. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint.
 - B. Cabinets: NEMA 250, Type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets 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. Use a comprehensive wiring method schedule on Drawings or use this Article to specify where various raceway types are to be installed. Edit examples below, adding or deleting materials and methods to suit Project. Coordinate with Division 16 Section "Wires and Cables." Do not duplicate information on Drawings, in NFPA 70, or in other Division 16 Sections. List exceptions to stated requirements. Check code to avoid specifying uses not permitted.
- B. Outdoors: Use the following wiring methods:
 - 1. Exposed: Rigid steel.
 - 2. Concealed: Rigid steel.
 - 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.
- C. Indoors: Use the following wiring methods:
 - 1. Exposed: EMT.
 - 2. Concealed: EMT.
 - 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): FMC; except in wet or damp locations, use LFMC.
 - 6. Damp or Wet Locations: Rigid steel conduit.
 - 7. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
 - a. Select 1 of 2 subparagraphs below and add other specific box and enclosure requirements to suit Project.
 - b. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

3.3 INSTALLATION

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.
- B. Select paragraph above or below.
- C. Minimum Raceway Size: **3/4-inch trade size** (DN21).
- D. Conceal conduit and EMT, unless otherwise indicated, within finished walls, ceilings, and floors.
- E. Keep raceways at least **6 inches** (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Install raceways level and square and at proper elevations. Provide adequate headroom.
- G. Complete raceway installation before starting conductor installation.
- H. Support raceways as specified in Section "Basic Electrical Materials and Methods."
- I. Use temporary closures to prevent foreign matter from entering raceways.
- J. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.
- K. 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.
- L. 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.
- 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 set screws 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. Flexible Connections: Use maximum of **6 feet** (1830 mm) 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.
- S. PVC Externally Coated, Rigid Steel Conduits: Use only fittings approved for use with that material. Patch all nicks and scrapes in PVC coating after installing conduits.
- T. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.5 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

SECTION 26 28 13

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fuses.

1.3 SUBMITTALS

- A. Use this Article to convey basic design intent. Delete if Drawings show sufficient detail to clarify intent.
- B. General: Submit each item in this Article according to the Conditions of the Contract and Specification Sections.
- C. Product Data for each fuse type specified.
- D. Select above or below. Data listed in paragraph below are appropriate where selective coordination is necessary.
- E. Field test reports indicating and interpreting test results.
- F. Maintenance data for tripping devices to include in the operation and maintenance manual specified in other sections.

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.
 - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

1.5 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects.
- B. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Spare Fuses: Furnish quantity equal to 20 percent of each fuse type and size installed, but not less than 1 set of 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering fuses that may be incorporated into the Work include, but are not limited to, the following:
- B. Retain above for nonproprietary or below for semiproprietary Specification. Refer to Division 1 Section "Materials and Equipment."

C. Manufacturers: Subject to compliance with requirements, provide fuses by one of the following:

2. Cooper Industries, Inc.; Bussmann Div.
3. Eagle Electric Mfg. Co., Inc.
4. Ferraz Corp.
5. General Electric Co.; Wiring Devices Div.
6. Gould Shawmut.
7. Tracor, Inc.; Littelfuse, Inc. Subsidiary.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class as specified or indicated; current rating as indicated; voltage rating consistent with circuit voltage.

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

- A. Select and edit paragraphs below. Add paragraphs as Project requires to specify fuse applications rather than show them on Drawings.
- B. Motor Branch Circuits: Class RK1, time delay.
- C. Other Branch Circuits: Class RK5, non-time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices as indicated. Arrange fuses so fuse ratings are readable without removing fuse.
- B. Install spare fuse cabinet where indicated.

3.4 IDENTIFICATION

- A. Install typewritten labels on inside door of each fused switch to indicate fuse replacement information.

END OF SECTION