

**SEWERAGE AND WATER BOARD
OF NEW ORLEANS**



**CONTRACT NO. 1435
SOLICITATION NO. 2023-SWB-71**

West Power Complex Electrical and Control Cable

**PROPOSALS DUE ON
OCTOBER 20, 2023 at 11:00 A.M., CENTRAL TIME**

SEWERAGE & WATER BOARD OF NEW ORLEANS

ADVERTISEMENT FOR BIDS

WEST POWER COMPLEX ELECTRICAL AND CONTROL CABLE

CONTRACT NO. 1435

SOLICITATION NO. 2023-SWB-71

The Sewerage and Water Board of New Orleans (Board) is soliciting bids from suppliers for the manufacture, storage, inventory services, and cut-to-length services associated with low-voltage power cable, medium voltage power cable, and control cable required for new West Power Complex projects.

Bid Documents and proposal forms are available for download on **October 2, 2023**, at the following websites:

SWBNO: https://www2.swbno.org/business_bidspecifications.asp

LAPAC: <https://wwwcfprd.doa.louisiana.gov/OSP/LaPAC/dspBid.cfm?search=department&term=181>

A **MANDATORY** pre-bid conference will be held on **October 10, 2023**, at **1:30 p.m.** Central Time at the Purchasing Conference Room 131, 625 St. Joseph Street, New Orleans, Louisiana or if you are unable to attend this in-person meeting, you can also join via teleconference call:

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 246 286 396 315

Passcode: wLtWB8

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 504-224-8698](tel:+15042248698), [687058288#](tel:+1504687058288) United States, New Orleans

Phone Conference ID: 687 058 288#

Bidder's failure to attend the mandatory pre-bid conference will be disqualified from presenting a bid submission.

All inquiries shall be directed to Shelita Sells, Procurement Analyst, at ssells2@swbno.org. The deadline for inquiries is on **October 11, 2023**, at **5:00 p.m.** Central Time.

Bids are due on **October 20, 2023, at 11:00 a.m.** Any Bids received after the specified time will be rejected.

Bids will then be publicly opened and read on **October 20, 2023, at 11:30 a.m.** at Sewerage and Water Board of New Orleans, 625 St. Joseph Street, Purchasing Conference Room 131, New Orleans, Louisiana. You can join in person or online at:

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 280 522 908 38

Passcode: gExHsS

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 504-224-8698,,849184482#](#) United States, New Orleans

Phone Conference ID: 849 184 482#

LATE BIDS WILL NOT BE ACCEPTED.

Sewerage and Water Board of New Orleans
Invitation to Bid
West Power Complex Electrical and Control Cable

Bidder's Information

1. Point of Contact/ Inquiries/ Requests for Information:

The point of contact for this ITB is Shelita Sells. All correspondence and other communications regarding this ITB shall be directed to Shelita Sells, Procurement Analyst, Sewerage and Water Board of New Orleans, 625 St. Joseph Street, Room 133, New Orleans, Louisiana 70165.

Inquiries and/or Requests for Information are due to the Board's Procurement Department via email to ssells2@swbno.org no later than timeline stated in the **Anticipated Bid Timetable** below. Any request received after that time may not be reviewed for inclusion in this ITB. The request shall contain the requester's name, address, and telephone number.

The Procurement Department will issue a response to any inquiry if it deems it necessary, by written addendum to the ITB, posted on Board's website, and issued prior to the ITB's Delivery Deadline. The Bidders shall not rely on any representation, statement, or explanation other than those made in this ITB or in any addenda issued. Where there appears to be a conflict between this ITB and any addendum issued, the last addendum issued will prevail.

Bids will be received by the Sewerage and Water Board of New Orleans Procurement Department as stated in the **Anticipated Bid Timetable**.

2. Submission Instructions:

Ways to submit a bid:

Hard Copy Submission:

- (1) Signed hardcopy of the bid in a sealed envelope

Mark the front envelope with the following:

Solicitation # Title of Bid

Company Name

Company Address

Company Contact Name, Phone Number, and Email Address

Address envelope to:

Sewerage and Water Board of New Orleans

Attn: Shelita Sells, Procurement Analyst

625 St. Joseph St. Rm 133
New Orleans, LA 70165

Fax and email submission will not be accepted.

3. Mail or courier specifications:

Bidder remains responsible for ensuring that the bid is delivered prior to the submission deadline with a proof of delivery. Failure to meet the submission deadline, irrespective of the mode of delivery, shall result in the rejection of the bid.

- Bid documents should be contained in a sealed envelope and be placed in the shipping envelope or box. If the mailed bid is not contained in a separate sealed envelope, the bidder takes the risk that the envelope may be inadvertently opened and the information compromised.
- Please add the Procurement Analyst's name in the Attention Line of the shipping label to ensure proper delivery.

4. Pre-Bid Conference

All bidders **must** attend a **mandatory** pre-bid conference at **1:30 p.m., October 10, 2023** at the Sewerage & Water Board Administrative Building, the Procurement Conference Room, Rm 131, located at 625 St. Joseph St., New Orleans, Louisiana 70165 or if you are unable to attend this in-person meeting, you can also join via teleconference call:

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 246 286 396 315

Passcode: wLtWB8

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 504-224-8698,,687058288#](#) United States, New Orleans

Phone Conference ID: 687 058 288#

Bidder's failure to attend the mandatory pre-bid conference will disqualify the bid submission.

Representatives from the Board will be available for discussions at this meeting. The purpose of the pre-bid conference is to provide assistance to interested contractors in the interpretation of the Invitation to Bid (ITB), DBE requirements and other technical and contractual matters.

Nothing stated or discussed during the course of this Pre-Bid Conference shall be considered to modify, alter or change the requirements of the ITB, unless it and until it has been subsequently incorporated into an addendum to the ITB and made publicly available. All

questions asked during the pre-bid conference deemed to be pertinent by the Board will be addressed in an addendum following the pre-bid conference.

5. **Bid Opening**

Bids will be received by the Sewerage and Water Board of New Orleans Procurement Department as stated in the **Anticipated Bid Timetable**.

Bids will be publicly opened in the Procurement Conference Room, Rm 131, located at 625 St. Joseph St., New Orleans, Louisiana 70165 or if you are unable to attend this in-person meeting, you can also join via teleconference call:

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 280 522 908 38

Passcode: gExHsS

[Download Teams](#) | [Join on the web](#)

Or call in (audio only)

[+1 504-224-8698,,849184482#](#) United States, New Orleans

Phone Conference ID: 849 184 482#

6. **Anticipated Bid Timetable**

The Board will make every effort to administer the ITB process in accordance with the terms and dates discussed in this solicitation. However, the Board reserves the right to modify the ITB process and dates as deemed necessary at its sole discretion. The Procurement Department will issue a written addendum to the ITB should there be any changes.

Event	Date	Local
ITB Release		
<u>Mandatory</u> Pre-Bid Meeting	October 10, 2023	1:30 pm
Bidders' Written Questions Deadline	October 11, 2023	5:00 pm
Responses to Questions	October 13, 2023	5:00 pm
Bid Due Date and Time	October 20, 2023	11:00 am

Bid Opening	October 20, 2023	11:30 am
Award of Contract	TBD	

7. Changes, Addenda, or Withdrawal of Bids Before Deadline:

Any changes or addenda to a bid must be submitted in writing, signed by the authorized representative, cross-referenced clearly to the relevant bid section, and received by the Board’s Procurement Department prior to the bid due date and time. Changes and addenda must meet all requirements for the bid. Any Bidder choosing to withdraw must submit a written withdrawal request to the Board’s Procurement Department prior to the bid due date and time.

8. Prohibition on Communication:

From the time of advertising, and until the final award, there is a prohibition on communication by any Bidder (or anyone on their behalf) with the Board staff. Breaking the established prohibition on communication may result in a disqualification of the bid.

The point of contact for this ITB is Shelita Sells. All correspondence and other communications regarding this ITB shall be directed to Shelita Sells, Procurement Analyst, Sewerage and Water Board of New Orleans, 625 St. Joseph Street, Room 133, New Orleans, Louisiana 70165.

9. Economically Disadvantaged Business Program

To ensure the full participation of DBEs in all phases of the Board’s procurement activities, all Bidders at time of bid submission shall complete and submit an Economically Disadvantaged Business Participation Summary Sheet along with signed correspondence of acceptance on the State and Local Disadvantaged Business Enterprise(s) (SLDBE(s)) letterhead.

A DBE goal of **ten percent (10%)** has been established for this ITB. If a DBE Participation Summary Sheet is not submitted and signed correspondence are not submitted, it shall be determined that the bid is considered non-responsive.

Bidders must use their best efforts to carry out this policy by utilizing the current listings of approved DBE vendors available at the Board’s website at https://www.swbno.org/business_disadvantagedbusinessprogram.asp.

10. Bidders must complete all required attachments. Failure to complete and submit the required documents and attachments shall result in your bid being deemed non-responsive.

NOTE: BIDS ON FORMS OTHER THAN THOSE PROVIDED WITH THIS SOLICITATION WILL BE REJECTED.

11. All bids must be received by the Board on or before the Delivery Deadline. Bids delivered after the said deadline shall be rejected.
12. The naming of a certain brand, make, or manufacturer, or definite specifications, is used only to denote the quality standard of product desired. The bidder is not restricted to a specific brand, make, manufacturer or specification named. The brand, make, manufacturer or definite specification is used only to set forth and convey to prospective bidders the general style, type, character, and quality of product desired; equivalent products will be acceptable.
13. Bid Prices in the submission must be written or typed legibly. Erasures or other changes in the Bid Prices must be initialed by the Bidder.

NOTE: ONLY BIDS WRITTEN IN INK OR TYPEWRITTEN WILL BE ACCEPTED. PENCIL FIGURES OR PENCIL SIGNATURES WILL DISQUALIFY BIDDER.

14. Discrepancies between the indicated product of any row of figures on the Bid Form and the correct product will be resolved in favor of the actual correct product. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the actual correct sum. A fillable version of the bid form will be issued as an attachment to this ITB.
15. Submissions from any person, firm or corporation in default upon any contract with the Board will neither be received nor considered.
16. **Any bid which does not fully comply with all the provisions of the “Bidder’s Instructions” and the “Specifications” will be deemed non-responsive.**
17. If a Bidder withdraws their bid after the bid due date and time and/or the bid opening time, the withdrawing Bidder will be prohibited from resubmitting for this ITB, in accordance with La. R.S. 38:2214(D)(1).
18. The Contract may be awarded to a single bidder or to multiple bidders, whichever is deemed to be in the best interest of the Board. If two or more bids are received, equal in amount and lower than any other bid, the Board reserves the right to evaluate the bids and to decide which bid will be accepted. All other conditions being equal, preference will be given in accordance with La. R.S. 38:2184.
19. The Board reserves the right to reject any and all bids or proposals for just cause.
20. All bid pricing shall remain firm for a period of ninety (90) days after the date of bid opening.
21. Refer to Attachment L of this ITB for additional details on measurement and payment and pricing expectations.

22. Awards

The Board specifically reserves the right to evaluate bids and award items separately, grouped or on an all or none basis, and to accept the bid which is in the best interest of the Board, and to reject all proposals if that is in the best interest of the Board.

23. Objection of Recommendation/Award

Any formal protest against the recommendation of award which is to be made by an aggrieved Proposer must be submitted in writing to the Procurement Director, Cashanna K Moses at cmoses@swbno.org according to the Board's Policy 83(R): Procedural Rules for Bid Appeals.

24. Tabulations

To view unofficial bid tabulations after the bids have opened, please visit the Board website under Doing Business – Bids – Tabulations

https://www2.swbno.org/business_bidtabulations.asp

25. Ownership:

All bids to this ITB are the property of the Board for all purposes. Bidders must clearly mark individual documents or information that the applicant claims are exempt from public record disclosure and specifically justify the exemption. The Board does not guarantee the confidentiality of submissions.

26. Effect:

This ITB and any related discussions, evaluations, qualifications, or resulting solicitations by the Board or any person on its behalf create no rights or obligations whatsoever except as provided in this ITB. The Board may cancel or modify this ITB or any resulting solicitation at any time at will, with or without notice. Anything to the contrary notwithstanding, any professional services agreement executed by the Board will be issued the exclusive statement of rights and obligations extending from this solicitation.

27. Errors or Omissions:

The Board will not be liable for any error in any bid. Bidder will not be allowed to alter bid documents after the deadline for bid submission, except under the following condition: The Board reserves the right to make corrections or clarifications due to patent errors identified in bids by the Board or the Bidder. The Board, at its option, has the right to require clarification or additional information from the Bidder.

28. Cost of Preparation:

The Board is not liable for any costs incurred by prospective Bidders or Contractors prior to issuance of or entering a Contract. Costs associated with developing the bid, and any other

expenses incurred by the Bidder in responding to the ITB are entirely the responsibility of the Bidder and shall not be reimbursed in any manner by the Board.

29. Public Records Requests

To request a public record for the proposal documents, please submit to the following website: <https://swbno.nextrequest.com/>

Specifications

1. Technical Specifications

Refer to Attachment K for technical specifications for the scope of work.

2. Beginning Dates of Contract and Shipments

The initial contract period will be for a period of 1 year and will begin on the date the contract is signed by the Board. The contractor shall be prepared to begin shipments per the requirements listed in the technical specifications immediately upon execution of the contract.

3. Length of Contract Term

The Board has the right, at its option, to extend the duration of the contract as needed for continued storage, inventory, and cut-to-length services to accommodate duration of other contracts managed by the Board.

4. NON-COLLUSION STATEMENT

The Contractor confirms that this Agreement is entered into with the Board without any connection with any person or persons making a proposal for the same services, and that it is in all respects fair and without collusion or fraud; also that no member of the Board or public official of the City, who are by law are excluded from participation herein, is directly or indirectly interested herein or in furnishing the services to which it relates or in any portion of the profits thereof.

5. NON-SOLICITATION STATEMENT

The Contractor has not employed or retained any company or person, other than a bona fide employee working solely for it, to solicit or secure this Agreement. The Contractor has not paid or agreed to pay any person, other than a bona fide employee working for it, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from this Agreement.

6. CONVICTED FELON STATEMENT

By submitting a bid, the Contractor confirms that no principal, member, or officer of the Contractor has, within the preceding 5 years, been convicted of, or pled guilty to, a felony under state or federal statutes for embezzlement, theft of public funds, bribery, or falsification or destruction of public records.

ATTACHMENT A

INVITATION TO BID REQUIREMENTS

West Power Complex Electrical and Control Cable Supply and Management

Contract 1435

Please note this checklist serves ONLY as a helpful guide. The Solicitation Checklist DOES NOT relieve the Bidder of the responsibility of ensuring that all requirements are included with their response. Please review the solicitation in its entire requirements, specifications, terms, and conditions of the solicitation for details.

_____ Attachment B Cover Sheet **(Required)**

_____ Attachment C Bid Forms **(Required)**

_____ Attachment D Convicted Felon Affidavit **(Required)**

_____ Attachment E Non-Solicitation Affidavit **(Required)**

_____ Attachment F Conflict of Interest Disclosure Affidavit **(Required)**

_____ Attachment G Bidder Information **(Required)**

_____ Attachment H Corporate Resolution **(Required)**

_____ Attachment J Economically Disadvantaged Business Participation Summary Sheet (Please see document and Disadvantaged Business Enterprise Program Policy for instructions on submittal) **(Required)**

Attachment A Invitation to Bid Requirements **(Informational Purposes)**

Attachment I Disadvantaged Business Enterprise Program Policy **(Informational Purposes)**

Attachment K Technical Specifications for Bid **(Reference)**

Attachment L Contract Document **(Reference)**

Failure to submit all required documents will render your bid non-responsive.

ATTACHMENT B
COVER SHEET

Invitation to Bid: West Power Complex Electrical and Control Cable Supply and Management

Company Name: _____

Company Address: _____

Please provide the key contact person's information below:

Primary Contact Person:

Name: _____ Title: _____

Cell Phone: _____ Email Address: _____

This ITB must be signed by an authorized Representative of the Company/Firm for bid to be valid. Signing indicates you have read and comply with the Instructions and Conditions.

Name of Person Authorized to Sign: _____

Title of Person Authorized to Sign: _____

Signature of Person Authorized to Sign: _____

Email Address of Person Authorized to Sign: _____

Date: _____

ATTACHMENT C
BID FORM

UNIT PRICE MATERIAL BID FORM
West Power Complex Electrical and Control Cable
Contract 1435

Bid Item #	Cable Code#	Cable Description	Specification	Estimated Quantity (FT)	Unit Price (\$/FT)	Total Price (\$)
1	B01SXLTMMF	1 x SX LOOSE TUBE MULTIMODE FIBER OPTIC CABLE	27.13.23	15,000		\$ -
2	B02ACSDCOS	ACS DOOR CONTACT 2/C 300V OVERALL SHIELD	28.13.00	1,000		
3	B04TP023CAT6A	4 SHIELDED TWISTED PAIR #23 CAT6A PATCH CORD	27.13.23	2,000		
4	B16ACSCRDOS	ACS CR DOOR 16/C 300V OVERALL SHIELD	28.13.00	2,000		
5	B18ACSCRIOOS	ACS CR IN/OUT 18/C 300V OVERALL SHIELD	28.13.00	4,000		
6	C01010SIS	1/C #10 600V SIS	26.05.19	1,000		
7	C01014SIS	1/C #14 600V SIS	26.05.19	2,000		
8	C02010	2/C #10 600V	26.05.19	1,000		
9	C02014	2/C #14 600V	26.05.19	1,000		
10	C04010	4/C #10 600V	26.05.19	5,000		
11	C05014	5/C #14 600V	26.05.19	1,500		
12	C07014	7/C #14 600V	26.05.19	12,000		
13	C12014	12/C #14 600V	26.05.19	1,000		
14	D01SMFMP	1 FIBER SINGLE MODE FIBER OPTIC PATCH CABLE	27.13.23	5,000		
15	D01SXLTSMF	1 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23	8,000		
16	D04SXLTSMF	4 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23	12,000		
17	D04TP023CAT6A	4 SHIELDED TWISTED PAIR #23 CAT6A PATCH CORD	27.13.23	5,000		
18	D04TP024	4 TWISTED PAIR #24	27.13.23	1,000		
19	D08SXLTSMF	8 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23	12,000		
20	F02014FPLP	2/C #14 SOLID 300V FPLP	28.31.11	2,000		
21	F02018FPLP	2/C #18 SOLID 300V FPLP	28.31.11	2,000		
22	G01006SDBC	1/C #6 SOFT DRAWN BARE COPPER	26.05.19	4,000		
23	G011/0I	1/C #1/0 INSULATED GROUND	26.05.19	70,000		
24	G01250I	1/C 250MCM INSULATED GROUND	26.05.19	100,000		
25	G014/0I	1/C #4/0 INSULATED GROUND	26.05.19	12,000		
26	G014/0SDBC	1/C #4/0 SOFT DRAWN BARE COPPER	26.05.19	80,000		
27	H01250S	1/C 250MCM 25KV SHIELDED	26.05.13	5,000		
28	H01750S	1/C 750MCM 25KV SHIELDED	26.05.13	135,000		
29	J01002S	1/C #2 5KV SHIELDED	26.05.13	1,000		
30	J01250S	1/C 250MCM 5KV SHIELDED	26.05.13	10,000		
31	J01500S	1/C 500MCM 5KV SHIELDED	26.05.13	38,000		
32	J01750S	1/C 750MCM 5KV SHIELDED	26.05.13	10,000		
33	J031/0GS	3/C #1/0 W/G 5KV SHIELDED	26.05.13	1,500		
34	K01PR014OS	1 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19	20,000		
35	K02PR014OS	2 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19	1,000		
36	K02PR016OS	2 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19	1,000		
37	K02TR016OS	2 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19	1,000		
38	K04PR014OS	4 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19	1,000		
39	K06PR014OS	6 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19	1,000		
40	K12PR014OS	12 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19	10,000		
41	L01750	1/C 750MCM 600V	26.05.19	20,000		
42	L031/0G	3/C #1/0 W/G 600V	26.05.19	1,400		
43	L03250G	3/C 250MCM W/G 600V	26.05.19	1,000		
44	L034/0G	3/C #4/0 W/G 600V	26.05.19	8,000		
45	L03500G	3/C 500MCM W/G 600V	26.05.19	2,000		
46	P02004G	2/C #4 W/G 600V	26.05.19	1,000		
47	P02008G	2/C #8 W/G 600V	26.05.19	1,000		
48	P02010	2/C #10 600V	26.05.19	1,500		
49	P02010G	2/C #10 W/G 600V	26.05.19	15,000		
50	P02012G	2/C #12 W/G 600V	26.05.19	28,000		
51	P03002G	3/C #2 W/G 600V	26.05.19	1,000		
52	P03004G	3/C #4 W/G 600V	26.05.19	2,000		
53	P03006G	3/C #6 W/G 600V	26.05.19	2,000		
54	P03008G	3/C #8 W/G 600V	26.05.19	1,400		
55	P03010G	3/C #10 W/G 600V	26.05.19	10,000		
56	S01500S	1/C 500MCM 15KV SHIELDED	26.05.13	18,000		
57	S01750S	1/C 750MCM 15KV SHIELDED	26.05.13	300,000		
58	X01PR016OS	1 PR #16 SH 600V OVERALL SHIELD	26.05.19	5,000		
59	X04PR016OS	4 PR #16 SH 600V OVERALL SHIELD	26.05.19	5,000		
					TOTAL	\$ -

ATTACHMENT D
CONVICTED FELON AFFIDAVIT

STATE OF _____

PARISH/COUNTY OF _____

Before me, the undersigned authority, came and appeared _____,

who, being first duly sworn, deposed and said that:

1. He/She is the _____ and authorized representative of _____, hereafter called "Contractor."
2. The Contractor complies with City Code Section 2-8 (c) for the City of New Orleans.
3. No Contractor principal, member, or officer has, within the preceding five years, been convicted of, or pled guilty to, a felony under state or federal statutes for embezzlement, theft of public funds, bribery, or falsification or destruction of public records.

Proposer Representative (Signature)

(Print or type name) (Address)

Sworn to and subscribed before me, in (CITY/STATE) _____

This ____ day of (MONTH) _____, 20 ____.

Notary Public

Notary Identification No./Bar Roll No.

ATTACHMENT E
NON-SOLICITATION AFFIDAVIT

STATE OF _____

PARISH/COUNTY OF _____

Before me, the undersigned authority, came and appeared _____,

who, being first duly sworn, deposed and said that:

1. He/She is the _____ and
authorized representative of _____ hereafter called "Contractor."
2. The Contractor has not employed or retained any company or person, other than a bona fide employee working solely for Contractor, to solicit or secure the subject contract. The Contractor has not paid or agreed to pay any person, other than a bona fide employee working for Contractor, any fee, commission, percentage, gift, or any other consideration contingent upon or resulting from the subject contract.

Contractor Representative (Signature)

(Print or type name) (Address)

Sworn to and subscribed before me, in _____, Louisiana,

this ___ day of _____, 20 _____.

Notary Public

Notary Identification No./Bar Roll No.

ATTACHMENT F
NON-COLLUSION AFFIDAVIT

STATE OF _____

PARISH/COUNTY OF _____

_____, being first duly sworn, deposes and says that:

(1) S/He is (Owner) (Partner) (Office) (Representative) or (Agent), of:

the Proposer that has submitted the attached Proposal:

(2) Such Proposal is genuine and is not a collusive or sham Proposal:

(3) Neither the said Proposer nor any of its officers, partners, owners, agents, representatives, employees or parties of interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly, or indirectly with any other Proposer, firm or person to submit a collusive or sham proposal in connection with the Contract for which the attached Proposal has been submitted or to refrain from proposing in connection with such contract, or has in any manner, directly or indirectly sought by agreement or collusion or communication or conference with any other Proposer, or to fix any overhead, profit or cost element of the proposal price or the proposal price of any other proposer, or to secure through any advantage against the Sewerage and Water Board of New Orleans of any person interested in the proposed contract; and

(4) The price or prices quoted in the attached Proposal are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Proposer or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Proposer Representative (Signature)

Title

(Print or type name)

SWORN TO AND SUBSCRIBED BEFORE ME

THIS _____ DAY OF _____ 20____. Notary ID#/Bar Roll # _____

NOTARY PUBLIC (Signature)

NOTARY PUBLIC (Print Name)

ATTACHMENT G
BIDDER INFORMATION

AN INDIVIDUAL

Individual's Name: _____

Doing business as: _____

Address: _____

Telephone No.: _____ Fax No.: _____ Email: _____

A PARTNERSHIP

Firm Name: _____

Address: _____

Name of person authorized to sign: _____

Title: _____

Telephone No.: _____ Fax No.: _____ Email: _____

A LIMITED LIABILITY COMPANY

Company Name: _____

Address: _____

Name of person authorized to sign: _____

Title: _____

Telephone No.: _____ Fax No.: _____ Email: _____

A CORPORATION

IF PROPOSAL IS BY A CORPORATION, THE CORPORATE RESOLUTION MUST BE SUBMITTED WITH PROPOSAL. (CORPORATE RESOLUTION EXAMPLE INCLUDED IN ATTACHMENT H)

ATTACHMENT H
CORPORATE RESOLUTION (EXAMPLE)

A meeting of the Board of Directors of _____ a corporation organized under the laws of the State of _____ and domiciled in _____ was held this _____ day _____, 20____ and was attended by a quorum of the members of the Board of Directors.

The following resolution was offered, duly seconded and adopted by said quorum:

BE IT RESOLVED, that _____ is hereby authorized to submit proposals and execute agreements on behalf of this corporation with the Sewerage and Water Board of New Orleans.

BE IT FURTHER RESOLVED, that said authorization and appointment shall remain in full force and effect, unless revoked by resolution of this Board of Directors and that said revocation will not take effect until the Procurement Director of the Board, shall have been furnished a copy of said resolution, duly certified.

I, _____, hereby certify that I am the Secretary of _____, a corporation created under the laws of the State of _____; that the foregoing is a true and exact copy of a resolution adopted by a quorum of the Board of Directors of said corporation at a meeting legally called and held on the _____ day of _____, 20____, as said resolution appears of record in the Official Minutes of the Board of Directors in my possession.

This _____ day of _____, 20____

SECRETARY

ATTACHMENT I

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

In accordance with the adoption of Resolution R231-97, the Sewerage and Water Board of New Orleans has established a race- and gender-neutral Disadvantaged Business Enterprise (DBE) Plan. The prime contractor shall be required to make a demonstrated good faith effort to award (10%) percent of the amount of the contract to certified disadvantaged business enterprises as **service providers or suppliers performing commercial useful functions which are consistent with the services or supplies required on this contract.** The percent participation having been determined for this specific contract by recommendation of the **Staff Contract Review Committee (SCRC)**, which is comprised of Sewerage and Water Board staff members. This percentage requirement shall be considered an informality which is subject to modifications and may be waived or adjusted by the Sewerage and Water Board of New Orleans if the prime contractor, after having demonstrated a good faith effort, is unable to comply with the requirement.

DEMONSTRATED GOOD FAITH EFFORTS

Before receiving an award of the contract, the contractor must meet the DBE goals or prove that he/she has made demonstrated good faith efforts to do so. To determine whether a particular contract bidder has made demonstrated good faith efforts to reach the DBE participation goal, the Board and its staff will consider the following:

- a. whether the contractor attended all pre-bid meetings that may have been scheduled by the Board to inform DBE firms of subcontracting opportunities and/or requested the Board Directory of Certified DBE firms;
- b. whether the contractor advertised in general circulation and trade association publications, concerning the DBE subcontracting opportunities, and allowed the subcontractors reasonable time to respond;
- b. whether the contractor provided written notice to a reasonable number of individually named DBE firms and allowed sufficient time for the DBE firms to participate effectively;
- c. whether the contractor followed up initial solicitations of interest by contacting DBEs to determine with certainty whether the DBEs were interested in bidding;
- d. whether the contractor selected specific portions of the work to be performed by DBEs in order to increase the likelihood of meeting the

DBE goals (including breaking down contracts into smaller units to facilitate DBE participation);

- e. whether the contractor provided interested DBEs with adequate information about the plans, specifications and requirements of the contract;
- f. whether the contractor negotiated in “good faith” with interested DBEs and did not reject DBEs as unqualified without sound reasons based on a thorough investigation of their capabilities;
- g. if the contractor did reject a DBE as unqualified, the contractor must state his or her reason for doing so in writing;
- h. whether the contractor has used the services of available community organizations and small and/or disadvantaged business groups; local, state and federal small or disadvantage business assistance offices; and other organizations that provide assistance in the recruitment and placement of DBE firms;
- i. whether the contractor has made sufficient efforts to negotiate with DBEs for specific sub-bids, including at a minimum:
 - (1) names, addresses, telephone numbers of DBEs that the contractor contacted,
 - (2) a description of information provided to those DBE firms, and
 - (3) a statement of why additional agreements with DBEs were not reached to include but not limited to proof the DBEs’ price exceeded that of non-DBEs.

1. Policy:

It is the policy of the Board that DBE firms, as defined in the Board’s Disadvantaged Business Enterprise Plan, shall have the maximum allowable opportunity to compete for the award of the participation in the performance of the Board’s publicly bid contracts. Consequently, the SCRC and the Board have set the DBE participation goal applicable to this Professional Service and/or Goods and Service contract.

2. DBE Obligation:

The Board and its contractors agree to ensure that DBEs, as defined in the Board’s Disadvantaged Business Enterprises Plan, shall have the maximum allowable opportunity to compete for the award of the participation in the performance of contracts and subcontracts provided under this agreement. In this regard, contractors shall take all necessary and reasonable steps in accordance with this DBE Plan to

ensure that DBEs have the maximum allowable opportunity to compete for such contracts. The Board and its contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of the Board's publicly bid contracts.

3. **Utilization of DBE Vendor Listings:**

All bidders are required to utilize the most recent Sewerage and Water Board State-Local Disadvantaged Business Enterprise Program Approved Vendor Listings for **Goods & Services/Professional Services**, in their selection of DBE entities to meet DBE participation goals. **Bidders are required to utilize DBE's as service providers or suppliers only in the areas for which they are certified. A description of the areas of work that DBE's can provide is contained in these vendor listings.** In addition, an alphabetical list of vendors/contractors is provided indicating the name of the company, address, name of owner, telephone number, fax number, the date the company became certified, and a description of the work that these entities are certified to perform. **Companies that are already certified as a DBE cannot fulfill the DBE requirements by listing themselves as the subcontractor to meet the DBE goal. The prime contractor shall select another DBE from the Sewerage and Water Board's Approved Vendor Listing.**

4. **Contacting DBE's and Obtaining a Firm Price**

All prime contractors/vendors are required to contact DBE's and obtain a firm price before listing the DBE's on the Participation Summary Sheet. As confirmation of established contact, bidder will include with their Participation Summary Sheet submission a signed correspondence from the SLDBE subcontractor on their own letterhead that reaffirms negotiated terms such as scope of work and monetary compensation.

5. **Failure to Comply with DBE Bid Specifications:**

All bidders for this Board contract are hereby notified that failure to comply with the above DBE specifications may constitute the bid as being non-responsive, and sufficient cause for rejection.

6. **Failure to Carry Out DBE Policy:**

All bidders, potential contractors, or subcontractors for this Board contract are hereby notified that failure to comply with the DBE policy and DBE obligations, set forth above, shall constitute a breach of contract which may result in termination of the contract or such other remedy as deemed appropriate by the Board, to include excluding bidder from bidding on future Board contracts.

7. Setting Minimum Participation Goals:

The stated minimum percentage DBE participation goal recommended by SCRC and approved by the Board applies to the work of this contract. Bids which are not accompanied by a properly completed Schedule of DBE Participation Summary Sheet showing that at least the percentage goal of the total contract bid price will be subcontracted or otherwise awarded through procurement action to DBEs shall be considered unresponsive, unless:

- a.** An affidavit is furnished by the bidder with its bid showing that the DBE goals cannot be met for the following reasons:
 - (1) No DBE firms made offers. Here, it must be shown, documented and demonstrated that good faith efforts (as defined in Part III, D, 2. of the Board's DBE plan) were made by the bidder to obtain the participation of DBE firms and that they did not respond, or
 - (2) The DBE offers made and accepted for subcontract and/or material supplies do not total the stated goal for participation, but total a lesser percentage, and
 - (3) The bidder was unable to obtain DBE further participation, despite his or her demonstrated good faith efforts (as defined in Part III, D, 2 of the Board's DBE Plan) to obtain additional participation by DBE firms.
- b.** Each of the assertions made by the bidder must be supported by documentary evidence.

8. Other Clauses Unaffected:

Nothing contained herein shall invalidate, change, annul, release, restrict, or affect the liability on the bonds or insurance given by the contractor, or the time required for completion of the contract.

9. Determination of Efforts to Meet Goals:

Initial determination of bidder efforts to meet the DBE participation goal shall be based on the DBE participation representations submitted with the bid. Bidders shall submit all the forms required herein with their bids, and the DBE office will examine

the contents thereof. The Board's DBE Officer may, if deemed advisable, request further information, explanation, or justification from any bidder.

10. Contract Monitoring:

- a.** The Board's DBE Office will monitor contractor during the operation of the contract to insure that the contractor meets all of its DBE obligations as specified in the contract bid. The Board's DBE office shall establish rules and regulations, to be approved by the Board, for the ongoing monitoring of contractor compliance.
- b.** Disadvantaged Business Enterprise Program Office personnel or their designated representative shall be allowed to conduct periodic monitoring of contractors' compliance with the agreed to Disadvantaged Business Enterprise Program participation requirements. Contractors shall be required to complete and return to the Disadvantaged Business Enterprise Program Office in the time required all requests for information and data relative to the contractors' activities in meeting the required Disadvantaged Business Enterprise participation goal. Additionally, Disadvantaged Business Enterprise Office personnel or their designated representative shall have access to contractor and subcontractor(s) records pertaining to, but not specifically limited to labor, costs and materials supplied and used on the Board contract, as well as inspection and photocopying of any and all contracts, agreements and correspondence relative to the Disadvantaged Business Enterprise contract participation requirements. Such inspection will be performed during normal business hours, and will be conducted in such a fashion so as to minimize interference with production of the contract. Visits may be made to job sites, as well as to administrative offices of the contractor and subcontractor(s) participants. Such inspection and on-site visits may be scheduled with or without prior notice to the contractor or Disadvantaged Business Enterprise subcontractor participant. Contractors' failure to comply with these monitoring requirements may result in termination of the contract or such other remedy as deemed appropriate by Board.

11. Maintaining Records:

Subsequent to the completion of a contract, contractors are required to maintain for three (3) years such records as are necessary to determine compliance with their DBE obligations. During construction, or performance of the DBE obligations, contractors shall submit reports as requested to enable the DBE Office to monitor this compliance.

12. Umbrella Bonding:

On contracts where subcontracting exists and where practicable (i.e., when a substantial risk or financial hardship would not be incurred by the prime contractor), the contractor may use an umbrella bond to encompass the DBE firm.

13. Board Action to Seek Compliance:

The contractor consents to such appropriate actions taken to ensure that prime contractors and subcontractors comply with the DBE provisions, to include but not limited to:

- a. desk audits to review all material, and information concerning the contractor's compliance;
- b. on-site reviews that may include interviews, visits to project locations, and inspection of documents and/or information not available at the desk audit that pertains to the contractor's compliance;
- c. any additional investigation that may be called for by a lack of proper record keeping, failure of the prime contractor to cooperate; failure of DBEs to cooperate; visible evidence unsatisfactory performance; other evidence as may warrant further investigation.

14. Non-Compliance Finding:

The Board staff will make compliance determinations regarding its prime contractors. Documentation of noncompliance will include the specific areas in which the contractors failed to comply. In these instances, appropriate legal action consistent with the DBE and other contract provisions will be taken.

15. Contractor's Duties

a. Record Keeping

Successful bidders shall establish and maintain records and submit regular reports to the DBE office as required, which will identify and assess progress in achieving DBE subcontract goals and other DBE participation efforts.

b. Failure To Comply With EDBP Participation Requirements

Failure to comply with any of the EDBP requirements of this contract shall constitute a violation of the terms and conditions of this contract

and a cause for the termination of the contract at the option of the Board.

Such violations shall include, but not limited to:

Failing to meet the percentage participation requirements as set out in the contract documents.

Failing to use certified EDBP contractors/vendors in performing the scope of work as identified in the contract documents (EDBP participation summary sheet).

Failing to comply with the “monitoring of EDBP requirements” included herein as part of the contract, such as contractors:

Failure to submit quarterly report and any other necessary reports timely and adequately as required by the EDBP Office.

Failure to grant access to contractor/subcontractor records by EDBP Office personnel, and

Failure to allow on-site investigations and visits, etc.

Failing to report the removal or termination of a certified EDBP vendor/subcontractor.

Failing to secure authorization for replacement of certified EDBP subcontractors from the Director of the Economically Disadvantaged Business Program.

In Lieu of termination the Board, through the EDBP Office, may impose the following penalties:

Withhold from the contractor in violation up to 10% of all future payments due to the contractor, until such time as the violations have been corrected.

Withhold from the contractor in violation, all future payments until such time as the violations have been corrected.

c. Subcontract Clause

All bidders and potential contractors must assure the Board that they will include the above clauses in all agreements, which offer further subcontracting opportunities.

d. Contract Award

Bidders are hereby advised that meeting DBE subcontract goals or making a demonstrated good faith efforts to meet such goals are conditions of being awarded and maintaining construction, procurement, or professional services contracts by the Board.

e. Restrictions on DBE Subcontracting

No **DBE** subcontractor or vendor selected to perform work as a **DBE** on a Sewerage and Water Board contract will be allowed to subcontract any portion of its work to a Non-Board certified **DBE**, unless the work to be performed is necessary for the execution of the contract and there are no Board certified **DBE**'s available to perform such work.

This process will require that each **DBE** participant performing work on a Sewerage and Water Board funded contract submit a request to subcontract out any portion of work deemed necessary for execution of the contract to the Board's **EDBP** office. On a form provided by the **EDBP** office, the **DBE** contractor or vendor will indicate the dollar amount of work to be subcontracted, the specific scope or nature of the work, the percentage of the total amount of work to be performed by the **DBE** subcontractor and vendor, and the entity to whom the work will be subcontracted.

Both prime and **DBE** subcontractors are advised that the failure to comply with these requirements may result in the loss of **DBE** certification and non-compliance by the prime contractor in meeting **DBE** contractual obligations.

f. Changes In DBE Participation

The prime contractor will not be allowed to make changes in DBE participation without submittal of a written request explaining reason, a revised Participation Summary Sheet and approval by the Director of the Economically Disadvantaged Business Program. Failure to comply with these requirements may result in non-compliance by the prime contractor in meeting DBE contractual obligations.

16. POLICY TO ENHANCE THE USE OF DBE VENDORS

All vendors/contractors are encouraged to identify and use S&WB certified **DBE** vendors to the fullest extent possible in major as well as minor purchases of heavy equipment, hardware supplies, etc.

The Sewerage and Water Board has a long-standing commitment to fairness and equal opportunity in hiring and contracting. As such, the workforce of contractors/vendors is encouraged to be representative of a diverse population. Achievement of the full benefits of diversity will only come when an attitude of inclusion is adopted.

The Sewerage and Water Board believes that developing such a policy would be a positive step to increase the dollar value of contracts awarded to **DBE** vendors and subcontractors.

17. ACCESS TO APPROVED VENDOR LISTS

The current listings of Vendors approved by the Sewerage and Water Board are available for use by the bidders on the Sewerage and Water Board external Website, WWW.SWBNO.ORG.

ATTACHMENT J

ECONOMICALLY DISADVANTAGED BUSINESS PARTICIPATION SUMMARY SHEET

Minimum Percentage Goal Participation for this Contract is 10%

Contract Name and # _____

Name and Address of Disadvantaged Business Enterprise Company	Name of Contact Person	Scope of Work to be Performed	Dollar Amount of work to be performed	Percentage of Dollar Amount to Total Bid Price

THIS FORM MUST BE COMPLETED AND SUBMITTED BY ALL BIDDERS, ALONG WITH SIGNED CORRESPONDENCE FROM SLD BE(S) ON THEIR OWN LETTERHEAD REAFFIRMING NEGOTIATED TERMS, AT TIME OF BID. FAILURE TO DO SO MAY RENDER THE BID NON-RESPONSIVE.

BY SUBMITTAL OF THIS FORM, PRIME CONTRACTOR ACKNOWLEDGES THAT DBE(S) HAVE BEEN CONTACTED AND A FIRM PRICE HAS BEEN OBTAINED.

NOTE: Signature required even if judged NOT APPLICABLE by the BIDDER

Prime Representative Name: _____ <p align="center">Print Name</p>	Prime Signature: _____ <p align="center">Signature</p>
Prime Company's Name: _____	Date: _____
Prime Address: _____ _____	E-mail: _____

ATTACHMENT K

SEWERAGE and WATER BOARD

of

NEW ORLEANS

TECHNICAL SPECIFICATIONS

FOR

CONTRACT 1435

**WEST POWER COMPLEX ELECTRICAL AND
CONTROL CABLE**

SEPTEMBER 2023

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END OF SECTION

SECTION 01 11 01
PROJECT SUMMARY OF WORK

PART 1 - GENERAL

1.01 PROJECT DESCRIPTION

- A. The Contract C1435 West Power Complex Electrical and Control Cable Project includes manufacture, storage, inventory services, cut-to-length services, and inspection and testing services associated with low voltage power cable, medium voltage power cable, and control cable required for the new West Power Complex projects.
- B. All site construction activities, shipping, and installation of the materials supplied under Contract C1435 will be provided by others under separate contracts.

1.02 PROJECT CONSIDERATIONS

- A. Supply of the cable and management services is required for successful implementation of other ongoing supply and construction contracts. To maintain the overall construction schedule, inventory and responsiveness is an important aspect of this contract.
- B. Anticipated cable availability for each line item on the bid form shall be based on the following schedule. Actual quantity availability to be based on schedule prepared by C1420 Contractor.
 - 1. 25% of each line item no later than 01-Jun-2024
 - 2. 25% of each line item no later than 01-Jul-2024
 - 3. 50% of each line item no later than 01-Aug-2024
- C. Initial quantity orders will be placed by the C1420 Contractor, and updated as required by these specifications.

1.03 PROJECT SCOPE OF WORK

- A. Supply of all materials to complete the Work, as specified herein.
- B. Inventory management of cable material supply, including cable reel identification.
- C. Cut-to-length services and reel management services of all cable supplied under this contract.
- D. Inspection and testing of all material supplied under this contract.
- E. Refer to the following sections for more specific and detailed scopes of work:

C1435 WPC ELECTRICAL AND CONTROL CABLE

1. Section 01 31 13, Project Coordination
2. Section 01 61 00, Common Product Requirements.
3. Section 26 00 10, Electrical Summary of Work.
4. Section 26 05 10, Cable Management.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. The individual components and equipment shall be tested as required by the applicable sections and the detailed scopes of work. All criteria must be met for acceptance by Owner.

END OF SECTION

SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Owner – The Sewerage and Water Board of New Orleans (SWBNO).
- B. Designer – The entity or individual who is to act as the Engineer-of Record under the oversight and administration of the Owner. The term Designer may refer to a third-party Engineering Firm or a (SWBNO) department or individual.
- C. Change Order Request (COR) – A formal proposal written by the Contractor that requests changes to the Contract Price and/or Contract Times. Document will include reference number for tracking purposes and detailed description of and reason for proposed change, and such additional information as appropriate and as may be required for Contractor to accurately estimate cost and time impact on Project. Change to Contract Times must prove impact to the critical path of the project.
- D. Work Change Directive (WCD) – A written statement to Contractor signed by the Owner, recommended by the Designer, and acknowledged by the Contractor ordering an addition, deletion, or revision in the Work, or responding to emergencies or differing or unforeseen conditions under which the Work is to be performed. A Work Change Directive will not change the Contract Price or Contract Times but is evidence that the parties expect that the change ordered will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Times.
- E. Instruction to Contractor (ITC) – A document or written communication issued by the Owner or Designer directing the Contractor to prepare a proposal for a Change Order. An ITC may or may not influence the Contract Price or Times. An ITC may also be issued to clarify the drawings, specifications, or procedures.
- F. Field Change Order (FCO) – A document formalizing the approval of a Change Order. This document will include all paperwork submitted by the Contractor and Designer to initiate the change, including the WCD or ITC, the COR, all supporting documentation submitted by the Contractor, and an analysis of the changes requested by the Designer justifying the increase/decrease to the Contract Prices/Times. Multiple FCOs may be combined into a single Change Order as defined below.
- G. Change Order – A document authorizing an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times. Approval of a Change Order is determined by SWBNO Policy and may be modified. Table 12-1 is included at the end of this document for reference on the Signature

authority for Change Orders. This Table was approved by Board Resolution R-063-2021. This approval may be either a Board of Directors Resolution or an Executive Director's Change Authority document. A Change Order may consist of multiple changes to Contract Price and/or Times that would be memorialized in multiple Field Change Orders (FCOs) if necessary.

- H. Request for Information (RFI) – A written request, from the Contractor to the Designer and/or Owners that asks for additional information or to clarify some aspect of the project, such as procedures, equipment, materials, specification details or drawing details.
- I. Work – The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.

1.02 INSTRUCTION TO CONTRACTOR (ITC)

- A. Owner may, in anticipation of ordering an addition, deletion, or revision to the Work, request Contractor to prepare a detailed proposal of cost and times to perform contemplated change via an ITC.
- B. The ITC will include a reference number for tracking purposes and detailed description of and reason for proposed change, and such additional information as appropriate and as may be required for Contractor to accurately estimate cost and time impact on Project.
- C. Proposal requests via ITCs are for information only. Contractor is neither authorized to execute a proposed change nor to stop Work in progress as result of such request.
- D. Contractor's written proposal shall be transmitted to Designer for their review no later than 10 business days after Contractor's receipt of ITC.
- E. Owner's request for proposal or Contractor's failure to submit such proposal within the required time period will not justify a Claim for an adjustment in Contract Price or Times.

1.03 CHANGE ORDER REQUEST (COR)

- A. Include, at a minimum as part of the Contractor's Change Order Request (COR),
 - a. Specific references including Drawing numbers, Specification section and article/paragraph number, and Submittal type, Submittal number, date reviewed, Designer's comment, as applicable, with appropriate attachments.

- b. Stipulated facts and pertinent documents, including photographs and statements.
 - c. Interpretations relied upon
 - d. Description of nature and extent of Claim, who or what caused the situation, impact to the Work and work of others, and discussion of claimant's justification for requesting a change to Contract Price or Times or both.
 - e. Estimated adjustment in price claimant believes it is entitled to with full documentation and justification. Estimate is to be detailed in nature, addressing all elements, materials, parts, equipment, labor, components, and the like affected by and/or incorporated into the Work as a result of the claimed adjustment.
 - f. Requested Change in Contract Times: include at least progress schedule documentation showing logic diagram for request, documentation that float times available for Work have been used, and revised activity logic with durations including sub-network logic revisions, duration changes, and other interrelated schedule impacts, as appropriate.
 - g. Documentation and/or information as may be necessary as set forth below for Work Change Directive, and as Designer may otherwise require.
- B. For Work that will be performed by subcontract, Contractor is to submit three independent quotes that clearly reflect the scope of the respective modification. Additional supporting information as requested by the Designer shall be provided within 5 business days of request.
- C. For Work that is to be self-performed, the Contractor is to provide a detailed breakdown of the Work by labor, materials, and equipment, detailing the labor force, equipment requirements, and providing three independent quotes for the required materials. Labor rates are to be consistent with the wage rate schedule included within these Documents, and equipment rates are to be consistent with those terms established in the General and Supplementary Conditions, and expanded on herein below, as applicable. Again, additional supporting information as requested by the Designer shall be provided within 5 business days of request.

1.04 WORK CHANGE DIRECTIVES

- A. Designer will:
 - a. Initiate, including a description of the Work involved and any attachments
 - b. Sign and transmit electronic file to Owner for authorization.
 - c. Provide any additional documentation as requested per RFI.
- B. Owner will:
 - a. Sign, demonstrating approval of the changes involved.
 - b. Transmit electronic copies to Designer and Contractor
- C. Contractor will:

- a. Upon completion of Work covered by the WCD, submit COR documentation for inclusion in a Change Order
- b. Provide documentation including, but not limited to:
 - i. Detailed records of Work performed
 - ii. Information required to substantiate resulting change in Contract Times and Contract Price for Work
 - iii. Support Data such as: dates Work was performed and by whom; time records, wage rates paid, equipment rental rates; invoices and receipts for materials, equipment, and subcontracts
 1. Subcontracted Work: supply three independent quotes or documentation of cost reasonableness
 2. Self-performed Work: supply three independent pricing quotes for materials or documentation of cost reasonableness

1.05 CHANGE ORDERS

- A. Designer will prepare one electronic copy of proposed Change Order and transmit such with Designer's written recommendation based on one or multiple Field Change Orders.
- B. Upon receipt of recommended Change Order, Owner will either:
 - a. Execute Change Order, or
 - b. Return to Designer unsigned copies with written justification for not executing Change Order.
- C. Upon receipt of Owner-executed Change Order, Designer will transmit electronic packages to the Contractor, the Resident Project Representative or other field representative, and retain the package as part of the project file, or if Owner fails to execute the Change Order, Designer will promptly so notify Contractor and transmit Owner's justification to Contractor.
- D. Upon receipt of documentation of the Owner-executed Change Order, Contractor shall:
 - a. Perform Work covered by Change Order.
 - b. Revise Schedule of Values to adjust Contract Price and submit with next Application for Payment.
 - c. Revise Progress Schedule to reflect changes in Contract Times, if any, and to adjust times for other items of Work affected by change.
 - d. Enter changes in Project record documents after completion of change related Work.
- E. In signing a Change Order, Owner and Contractor acknowledge and agree that:
 - a. Stipulated compensation (Contract Price or Contract Times, or both) set forth includes payment for (i) the Cost of the Work covered by the Change Order, (ii) Contractor's fee for overhead and profit, (iii) interruption of Progress Schedule, (iv) delay and impact, including

- cumulative impact, on other Work under the Contract Documents, and (v) extended overheads.
- b. Change Order constitutes full mutual accord and satisfaction for the change to the Work.
- c. Unless otherwise stated in the Change Order, all requirements of the original Contract Documents apply to the Work covered by the Change Order.

1.06 CHANGE ORDER PROCESS SUMMARY

This Section is to be used in conjunction with the *Change Order Flowchart* included.

- A. Change Condition is identified by the Contractor.
- B. Contractor initiates and submits an RFI
- C. Designer responds to RFI indicating a Change Order is necessary.
- D. If the Change Condition could delay the overall project schedule by waiting for approval at the next SWBNO Board of Directors meeting, then a WCD is issued by the Designer/Owner. Otherwise, skip to step (E).
 - a. The Contractor begins Work as indicated in RFI Response/WCD.
 - b. Contractor submits costs incurred as COR.
 - c. If COR costs are justifiable, Designer/Owner creates FCO for Contractor signature.
 - d. Owner submits Change Order to Executive Director (ED Change Authority) or Board of Directors based on Table 12-1 copied at the end of this document.
 - e. After Approval of ED Change Authority or Board of Directors Resolution, Designer and/or Owner sign and return fully executed FCO(s) to Contractor.
 - f. Contractor may include costs in the next Pay Application.
- E. If the Change Condition does not impact the critical path of the project schedule, then the Designer/Owner submits an ITC to Contractor.
 - a. The Contractor takes instructions from ITC and creates a proposal to complete the Work and submits as an COR.
 - b. If COR costs are justifiable, Designer/Owner creates FCO for Contractor signature.
 - c. Owner submits Change Order to Executive Director (ED Change Authority) or Board of Directors based on Table 12-1 copied at the end of this document.
 - d. After Approval of ED Change Authority or Board of Directors Resolution, Designer and/or Owner sign and return fully executed FCO(s) to Contractor. Owner may concurrently issue a Notice to Proceed to Contractor for this Work.
 - e. Contractor may include costs as incurred in following Pay Application(s)

1.07 REFERENCE DOCUMENTS

- A. Contract Change Order Tier Summary per Resolution R-063-2021 (Attachment “A”)
- B. Change Order Flowchart (Attachment “B”)
- C. Instruction to Contractor Template/Example (Attachment “C”)
- D. Work Change Directive Template/Example (Attachment “D”)
- E. Field Change Order Template/Example (Attachment “E”)
- F. ED Change Authority Template/Example (Attachment “F”)

PART 2 PRODUCTS (NOT USED)

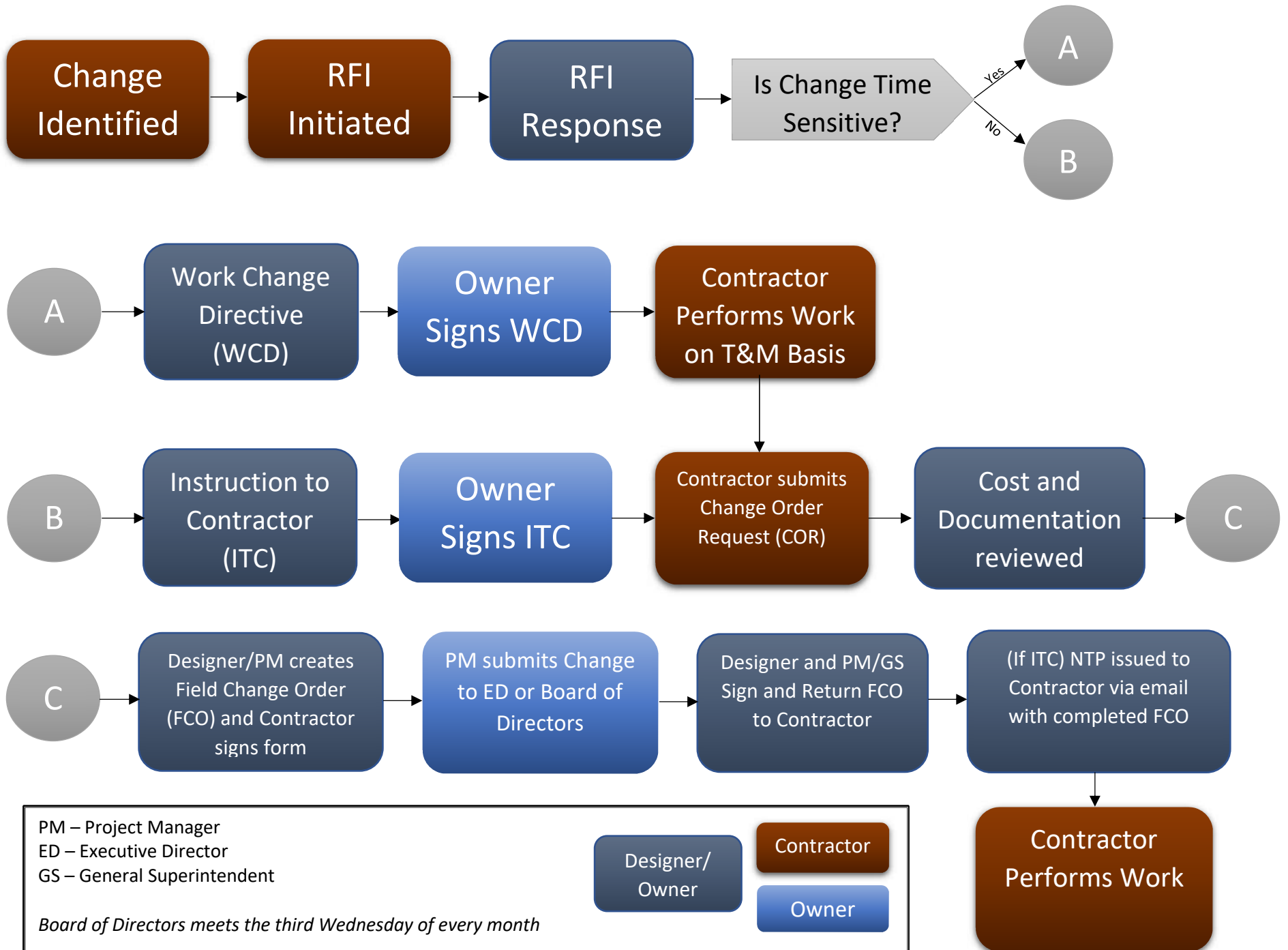
PART 3 EXECUTION (NOT USED)

END OF SECTION

Table 12-1. Contract Change Order Tier Summary

Contract Tier	Change Order Parameter	Signature Requirements
Tier One: Contract Aggregate <\$1,000,000		
Change Order Scenario 1	If a change order is below 10% of the original contract value	Executive Director approves change order and SWBNO Board of Directors is notified during monthly meetings
Change Order Scenario 2	If a change order exceeds 10% of the original contract value, and total contract value remains below \$1M	Executive Director approves change order and SWBNO Board of Directors is notified during monthly meetings
Tier Two: Contract Aggregate between \$1,000,000 and \$4,999,999.99		
Change Order Scenario 1	If a change order is less than \$250,000 or 20% of the original contract value (whichever is less considering cumulative amount of change orders)	Executive Director approves change order and SWBNO Board of Directors is notified during monthly meetings
Change Order Scenario 2	If a change order or aggregate of change orders exceeds \$249,999.99 or 20% of the original contract value (whichever is less considering cumulative amount of change orders)	SWBNO Board of Directors approves via F&A Committee. Executive Director signs resolution.
Tier Three: Contract Aggregate \$5,000,000 and above		
Change Order Scenario 1	If a change order is less than \$500,000 or 10% of the original contract value (whichever is less considering cumulative amount of change orders)	Executive Director approves change order and SWBNO Board of Directors is notified during monthly meetings
Change Order Scenario 2	If a change order or aggregate of change orders exceeds \$499,999.99 or 10% of the original contract value (whichever is less considering cumulative amount of change orders)	SWBNO Board of Directors approves via F&A Committee. Executive Director signs resolution.

CHANGE ORDER FLOWCHART





INSTRUCTION TO CONTRACTOR

_____	SWBNO Contract No.: _____
Contract Name	
_____	Reference RFI No.
Contractor	(If applicable) _____
_____	Instruction No. <u>001</u>
Contract Description/Specification Section	Date: _____

This instruction is issued to:

- Clarify drawings, specifications, or procedures.
- Request a proposal.
- Transmit drawings or documents for incorporation into the work.

The SWBNO is directing the Contractor to:

Recommended by Designer: _____

Authorized by Owner: _____

IF, IN THE CONTRACTOR'S OPINION, A CLARIFICATION INVOLVES WORK WHICH CHANGES THE CONTRACT PRICE OR TIME, YOU MUST SUBMIT A CHANGE ORDER REQUEST OR NOTICE AS REQUIRED IN THE CONTRACT DOCUMENTS.



WORK CHANGE DIRECTIVE NO.: 001

Owner: Sewerage & Water Board of New Orleans

Designer:

Contractor:

Owner's Project No.: Contract No.

Contract Name:

Date Issued:

Effective Date of Work Change Directive:

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments:

Purpose for the Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to change in Contract Price and Contract Time, is issued due to:

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price: _____ increase decrease not yet estimated
 Contract Time: _____ days increase decrease not yet estimated

Basis of estimated change in Contract Price:

- Lump Sum
- Unit Price
- Cost of the Work
- Other

	Recommended by Designer	Authorized by Owner	Received by Contractor
By:	_____	_____	_____
Title:	_____	_____	_____
Date:	_____	_____	_____



SWBNO FIELD CHANGE ORDER

FCO No.	Contract No.
Project Manager	Date
Project Name	Contractor
	Dated _____, _____ (Year)

**You are hereby requesting to make the following (In Scope) change(s) in accordance with the terms and conditions of the above contract

((Description of Change))

FOR THE (Additive/Deductive) Sum of	\$	-
Original Contract Amount	\$	1,000,000.00
Sum of Previous Changes	\$	3,000.00
Present Contract Amount	\$	1,003,000.00
This Change Add (Deduct)	\$	2,000.00
Proposed Contract Amount	\$	1,005,000.00

Commencement of Contract Times	1/1/2022
Contract Time (days)	365
Original Completion Date	1/1/2023
Previous Changes to Contract Times (days)	15
This Change to Times (days)	10
Revised Contract Completion Date	1/26/2023

Your acceptance of this Change Order shall constitute a modification to our Contract and will be performed subject to all the same terms and conditions in our Contract indicated above, as fully as if the same were repeated in this acceptance.

The adjustment, if any, to this Contract shall constitute a full and final settlement of any and all claims arising out of or related to the change set forth herein, including claims for impact and delay costs.

The Director of Procurement will direct the Contractor to increase the penal sum of the existing Performance, Payment Bonds and Insurance or to obtain additional bonds on the basis of a \$100,000.00 or greater value change order. The Contractor Shall: Provide written confirmation within one (1) week of request: from their bonding company/agent (attorney-in-fact) that the amounts of the Performance, Payment Bonds and Insurance have been adjusted to 100% of the new contract amount. NOTE: No Invoices for change order work shall be paid without approved supporting documentation.

Contractor _____
 Designer _____
 Project Manager _____
 General Superintendent _____

Contract
Number/Name:
Contractor:

This Change Order, in the amount of XXXXXXXX, represents additional construction costs (labor, material, and equipment) for _____. This change brings the accumulated contract change order total to \$XXXX, or XXX% of the original contract. The cumulative contract total is now \$XXXXXXXXXX.

Provide Details

Attachments: Board of Directors Contractor Fact Sheet, S&WB Cost Estimate, and Contractor's Proposals

Recommended by: _____
M. Ron Spooner
Interim General Superintendent

Pursuant to the approval authority vested in the Executive Director by Resolution R-063-2021, I hereby approve Change Order X as indicated above.

Ghassan Korban
EXECUTIVE DIRECTOR
SEWERAGE AND WATER BOARD OF NEW ORLEANS

**SECTION 01 29 00
PAYMENT PROCEDURES**

PART 1 GENERAL

1.01 SUBMITTALS

- A. Informational Submittals:
 - 1. Schedule of Values: Submit on Supplier's standard form.
 - 2. Schedule of Estimated Progress Payments:
 - a. Submit baseline forecast within 7 days of Owner acceptance of Schedule of Values.
 - b. Submit adjustments thereto with Application for Payment.
 - 3. Application for Payment.
 - 4. Final Application for Payment

1.02 SCHEDULE OF VALUES

- A. Prepare a separate Schedule of Values for each schedule of the Work under the Agreement. The Schedule of Values shall be based on the items in the Conformed Bid form utilizing the bid items as primary line items and breaking down the primary items into sub items as appropriate.
- B. Upon request of Engineer, provide documentation to support the accuracy of the Schedule of Values.
- C. Unit Price Work: Reflect unit price quantity and price breakdown from conformed Bid Form. Supplier should bid on unit prices at lengths shown on Unit Price Form, but may be adjusted by Owner by +/-20% without an increase to the Unit Price bid.
- D. Lump Sum Work:
 - 1. Reflect specified alternates, as applicable.
 - 2. Break down by Division 2 through 49 with appropriate subdivision of each Specification.
- E. An unbalanced or front-end loaded schedule will not be acceptable.
- F. Summation of the complete Schedule of Values representing all the Work shall equal the Contract Price.
- G. Submit Schedule of Values electronically in a spreadsheet format compatible with latest version of Excel. Include also three printed versions of the Schedule in the agreed to format(s).

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1.03 SCHEDULE OF ESTIMATED PROGRESS PAYMENTS

- A. Show estimated payment requests throughout Contract Times aggregating initial Contract Price.
- B. Base estimated progress payments on initially acceptable progress schedule. Adjust to reflect subsequent adjustments in progress schedule and Contract Price as reflected by modifications to the Contract Documents.

1.04 APPLICATION FOR PAYMENT

- A. Transmittal Summary Form: Attach one Summary Form with each detailed Application for Payment for each schedule and include Request for Payment of Materials and Equipment on Hand as applicable. Execute certification by authorized officer of Supplier.
- B. Use detailed Application for Payment Form acceptable to the Engineer.
- C. Provide separate form for each schedule as applicable.
- D. Include accepted Schedule of Values for each schedule or portion of lump sum Work and the unit price breakdown for the Work to be paid on a unit priced basis.
- E. Include separate line item for each Change Order and Work Change Directive executed prior to date of submission. Provide further breakdown of such as requested by Engineer.
- F. Preparation: Submit Application for Payment, including a Transmittal Summary Form and detailed Application for Payment Form(s) for each schedule as applicable, a listing of materials on hand for each schedule as applicable, and such supporting data as may be requested by Engineer.

1.05 MEASUREMENT—GENERAL

- A. Weighing, measuring, and metering devices used to measure quantity of materials for Work shall be suitable for purpose intended and conform to tolerances and specifications as specified in National Institute of Standards and Technology, Handbook 44.
- B. Whenever pay quantities of material are determined by weight, material shall be weighed on scales furnished by Supplier and certified accurate by state agency responsible. Weight or load slip shall be obtained from weigher and delivered to Owner's representative at point of delivery of material.

- C. If material is shipped by rail, car weights will be accepted provided that actual weight of material only will be paid for and not minimum car weight used for assessing freight tariff, and provided further that car weights will not be acceptable for material to be passed through mixing plants.
- D. Vehicles used to haul material being paid for by weight shall be weighed empty daily and at such additional times as required by Engineer. Each vehicle shall bear a plainly legible identification mark.
- E. Where measurement of quantities depends on elevation of existing ground, elevations obtained during construction will be compared with those shown on Drawings. Variations of 1 foot or less will be ignored, and profiles shown on Drawings will be used for determining quantities.
- F. Units of measure shown on Bid Form shall be as follows, unless specified otherwise.

<u>Item</u>	<u>Method of Measurement</u>
AC	Acre—Field Measure by Engineer
CY	Cubic Yard—Field Measure by Engineer within limits specified or shown
CY-VM	Cubic Yard—Measured in Vehicle by Volume
EA	Each—Field Count by Engineer
GAL	Gallon—Field Measure by Engineer
HR	Hour
LB	Pound(s)—Weight Measure by Scale
LF	Linear Foot—Field Measure by Engineer
MFBM	Thousand Foot Board Measure-Delivery Invoice
SF	Square Foot
SY	Square Yard
TON	Ton—Weight Measure by Scale (2,000 pounds)

1.06 PAYMENT

- A. The following sum of the items that are subsidiary to the whole Work. The cost of these items shall be balanced throughout the separate pay items:
 1. Insurance, permits and licenses.
 2. Administrative items.
 3. Mobilization, demobilization, insurance, and performance bonding.
 4. Indirect support services and support including temporary facility and quality control, inclusive of construction management/coordination/supervision and administration. Also includes the following:

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- a. Administrative items detailed within Section 01 33 00, Submittal Procedures. This includes preparation, printing, processing, delivery of submittals, resubmittal and other work as required and necessary for approval of materials, equipment, means and methods as detailed within the Contract Documents from the Engineer and Owner.
- B. Payment for all Lump Sum Work shown or specified in Contract Documents is included in the Contract Price. Payment will be based on a percentage complete basis for each line item of the accepted Schedule of Values.
- C. Payment for lump sum and unit price items covers all the labor, materials, and services necessary to furnish and install the items listed in Table 1.

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Table 1: Payment Items

Reference Number	Description	QTY	Unit of Measure	Measurement and Payment Item Description	Reference Specification (Including but not limited to)
1 - 59	CABLE AND WIRE LISTED ON THE C1435 BID FORM	See Bid Form	LF	Each bid item includes the material cost per linear foot for the specified cable and wire to be supplied under this Contract. Material costs may be billed upon approved submittal of certified test reports and documentation of material delivery (either to the approved storage facility or the project site).	26 05 10 – CABLE MANAGEMENT 26 05 13 – MEDIUM VOLTAGE CABLE 26 05 19 – LOW VOLTAGE CABLE 27 13 23 – OPTICAL FIBER BACKBONE CABLING 27 15 13 – COPPER HORIZONTAL CABLING 27 15 23 – OPTICAL FIBER HORIZONTAL CABLING 28 13 00 – SECURITY SYSTEMS 28 31 11 – ADDRESSABLE FIRE ALARM SYSTEM
60	Cable Management Services	12	MONTH	Payment of Cable Management Services will be based on submittal and Approval of Inspection Test Plan (including documentation of completed certified test reports), Cable Storage Plan, Cut-to-Length tracking, Cable Reel documentation, and monthly updated CMT form. This bid item includes storage, inventory management, cut-to-length services, and quality management services of all cable manufactured and reserved for SWBNO under this Contract. Inventory services may be billed on a monthly basis.	26 00 10 - ELECTRICAL SUMMARY OF WORK 26 05 10 – CABLE MANAGEMENT Other applicable technical specifications

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1.07 NONPAYMENT FOR REJECTED OR UNUSED PRODUCTS

- A. Payment will not be made for following:
1. Loading, hauling, and disposing of rejected material.
 2. Quantities of material wasted or disposed of in manner not called for under Contract Documents.
 3. Rejected loads of material, including material rejected after it has been placed by reason of failure of Contractor to conform to provisions of Contract Documents.
 4. Material not unloaded from transporting vehicle.
 5. Defective Work not accepted by Owner.
 6. Material remaining on hand after completion of Work.

1.08 PARTIAL PAYMENT FOR STORED MATERIALS AND EQUIPMENT

- A. Partial Payment: No partial payments will be made for materials and equipment delivered or stored unless storage of said materials/equipment is in accordance with manufacturer's instructions and are acceptable to Engineer.
- B. Request for payment shall include confirming documentation that the cited material or equipment has passed all acceptance testing and is stored per the requirements of the Contract documents. Failure to provide confirming documentation will result in denial of the request for payment. Payment for any approved stored materials or equipment shall not exceed 90 percent of the purchased value. Retainage will be withheld on the approved amount.
- C. Final Payment: Will be made only for products transferred to C1420 Contractor; remaining products, for which partial payments have been made, shall revert to C1435 Supplier unless otherwise agreed, and partial payments made for those items will be deducted from final payment.

1.09 PARTIAL PAYMENT FOR UNDELIVERED, PROJECT-SPECIFIC MANUFACTURED OR FABRICATED EQUIPMENT

- A. Notwithstanding above provisions, partial payments for undelivered (not yet delivered to Site or not stored in the vicinity of Site) products specifically manufactured for this Project, excluding off the shelf or catalog items, will be made when all following conditions exist:
1. Material is adequately insured, maintained, stored, and protected by appropriate security measures.
 2. Each item is clearly marked and segregated from other items to permit inventory and accountability.
 3. Authorization has been provided for access to storage Site for Engineer and Owner.
 4. Equipment or material meets applicable Specifications of these Contract Documents.

5. Engineer concurs that affected material or equipment was specifically manufactured for this Project.
- B. Payment of up to 90 percent of manufacturer's quoted price for undelivered, Project-specific material or equipment will be made following submittal of documentation confirming conformance with the Contract documents.
- C. Failure of Contractor to continue compliance with above requirements shall give cause for Owner to withhold payments made for such equipment from future payments.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. On or about the last week of each calendar month, the Supplier will estimate the total amount to date of the Work done and acceptable according to the Specifications, and the value of the said work at the prices bid or fixed in the contract, including such extra work as has been approved and completed according to the provisions of the contract terms. The designated percentage of the said value of the work done which will be retained by the Owner is as specified in the Agreement. The said percentage will be deducted from the amount earned, and the remainder of the amount earned, less all legal deductions and all previous payments, will be paid.
- B. An estimate of the value of the work completed will be submitted to the Engineer in draft form for review no less than 1 week prior to the date of formal submission. At that time the Engineer shall review and agree upon the proposed percent complete of each line item within the Schedule of Values that is showing progress and is requested for payment.
- C. Upon finalization of the estimate, the Engineer shall generate a formal application and certificate for payment and forward to the Supplier for signature and return. The Supplier shall submit the signed invoice with a signed cover letter, signed summary sheet, continuation sheet, single page invoice and back up as applicable. Supplier shall also submit the following with each application for payment:
 1. Updated Project Schedule.
 2. Updated Cable Management Tracker documents
 3. Evidence of current insurance.
 4. Confirmation that Supplier is current with payment to all subcontractors.
- D. Failure to submit required materials in support of the payment application will constitute grounds for rejection.

END OF SECTION

**SECTION 01 31 13
PROJECT COORDINATION**

PART 1 GENERAL

1.01 RELATED WORK

A. General:

1. Other work that is either directly or indirectly related to scheduled performance of the Work under these Contract Documents, listed henceforth, is anticipated to be performed by others.
 - a. C1415 WPC Foundations and Underground Package
 - b. C1417 SFC Procurement.
 - c. C1418 Utility Rack.
 - d. C1420 WPC Phase 1 Installation and Commissioning.
 - e. C1427 Packaged Auxiliary Electrical Equipment Procurement.
 - f. C1438 CTG7 Procurement.
 - g. C1440 GSU Procurement.
2. Coordinate the Work of these Contract Documents with work of others as specified in General Conditions.

- B. Agency and Contact Person(s):** A list of contact names/numbers will be provided by the Owner as part of the Contract Kickoff Meeting. Contractor will be responsible for coordination of all work with the applicable agency in accordance with the requirements to complete the work detailed within these Documents.

1.02 PROJECT SPECIFIC CONSIDERATIONS FOR 1435

- A. The C1435 Supplier will coordinate cable order requests with the Owner or Owner's Representative and the C1420 Contractor. Refer to Section 26 05 10, Cable Management for requirements related to cut-to-length services and inventory management services requiring coordination.
- B. Timeliness in delivery is important for the overall success of the related projects. Inventory management requirements and preparation-for-shipment timing are defined in Section 26 05 10, Cable Management.

1.03 PROJECT SPECIFIC DEFINITIONS

- A. The definitions listed in this section apply to the C1435 Work. Refer to Section 01 61 00, Common Product Requirements for other definitions.
- B. Contractor refers to Contract C1420 Contractor.
- C. Supplier refers to the entity performing the work under this Contract C1435.

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D. Owner's Site refers to 8800 S Claiborne Ave, New Orleans, LA 70118.

1.04 PROJECT MEETINGS

- A. Engineer will schedule meetings throughout progress of the Work, prepare meeting agenda with regular participant input and distribute with written notice of each meeting, preside at meetings, record minutes to include significant proceedings and decisions, and reproduce and distribute copies of minutes within 5 days after each meeting to participants and parties affected by meeting decisions.
- B. Contract Kickoff Meeting: Contractor shall be prepared to discuss the following subjects, as a minimum:
1. Required schedules.
 2. Status of Bonds and insurance.
 3. Sequencing of critical path work items.
 4. Progress payment procedures.
 5. Project changes and clarification procedures.
 6. Major product delivery and priorities.
 7. Storage and inventory plans.
 8. Material tracking and management.
- C. Progress Meetings: Engineer will schedule and facilitate regular progress meetings, conducted bi-weekly to review the Work progress, Progress Schedule, Schedule of Submittals, Application for Payment, contract modifications, and other matters needing discussion and resolution.
- D. Other Meetings: In accordance with Contract Documents and as may be required by Owner and Engineer.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PROJECT EXECUTION

- A. General
1. Refer to Specification Section 26 05 10 Cable Management.

END OF SECTION

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DEFINITIONS

- A. Action Submittal: Written and graphic information submitted by Contractor or Supplier that requires Engineer's approval.
- B. Informational Submittal: Information submitted by Contractor or Supplier that requires Engineer's review and determination that submitted information is in accordance with the Conditions of the Contract.

1.02 PROCEDURES

- A. Submittals should follow the Project Specific Records Management Information, attached as a supplement to this Specification.
- B. Electronic Submittals: Submittals shall, unless specifically excepted, be made in electronic format.
 - 1. Each submittal shall be an electronic file in Portable Document Format (PDF).
 - 2. Each submittal shall be delivered under the guidelines set out in the Project Specific Records Management Information, attached as a supplement to this Specification.
 - 3. Electronic files that contain more than ten pages in PDF format shall contain internal bookmarking from an index page to major sections of the Document.
 - 4. PDF files shall be set to open "Bookmarks and Page" view.
 - 5. Add general information to each PDF file, including title, subject, author, and keywords.
 - 6. PDF files shall be set up to print legibly at 8.5-inch by 11-inch, 11-inch by 17-inch, or 22-inch by 34-inch. No other paper sizes will be accepted.
 - 7. Submit new electronic files for each resubmittal. Resubmitted file must be a complete file with corrections annotated appropriately.
 - 8. Include a copy of the Contractor's Submittal form with each electronic file.
 - 9. Engineer will reject a submittal that is not electronically submitted, unless specifically excepted.
 - 10. Provide Engineer with authorization to reproduce and distribute each file as many times as necessary for Project documentation.

C. Transmittal of Submittal:

1. Complete, sign, and transmit with each submittal package, one Submittal form in format approved by Engineer.
2. Identify each submittal with the following:
 - a. Numbering and Tracking System:
 - 1) Sequentially number each submittal.
 - 2) Resubmission of submittal shall have original number with sequential alphabetic or numeric suffix.
 - b. Specification section and paragraph to which submittal applies.
 - c. Project title and Engineer's project number.
 - d. Date of transmittal.
 - e. Names of Contractor, Subcontractor or Supplier, and manufacturer as appropriate.
3. Specific details must be included identifying and describing any deviation or variation from Contract Documents.

D. Format:

1. Do not base Shop Drawings on reproductions of Contract Documents.
2. Package submittal information by individual Specification section. Do not combine different Specification sections together in submittal package, unless otherwise directed in Specification.
3. Present in a clear and thorough manner and in sufficient detail to show kind, size, arrangement, and function of components, materials, and devices, and compliance with Contract Documents.
4. All documents, Drawings, and data submitted shall be in the English language, with all dimensions in USCS units.

E. Timeliness: Schedule and submit in accordance with Schedule of Submittals, and requirements of individual Specification sections.

F. Processing Time:

1. Time for review shall commence upon Engineer's receipt of submittal.
2. Engineer will consult with Owner and act on Contractor's submittal and transmit response to Contractor not later than 2 weeks after receipt, unless otherwise specified.
3. Resubmittals will be subject to same review time.
4. No adjustment of Contract Times or Price will be allowed as a result of delays in progress of Work caused by rejection and subsequent resubmittals.

G. Resubmittals: Clearly identify each correction or change made and include an index of changes/corrections as a submitted item annotated accordingly on the submittal transmittal.

H. Incomplete Submittals:

1. Engineer will return entire submittal for Contractor's revision if preliminary review deems it incomplete.
2. When any of the following are missing, submittal will be deemed incomplete: Submittal form; completed and signed.

I. Submittals not required by Contract Documents: Will not be reviewed and will be returned stamped "Not Subject to Review/For Information Only."

1.03 ACTION SUBMITTALS

A. Prepare and submit Action Submittals required by individual Specification sections.

B. Shop Drawings:

1. Identify and Indicate:
 - a. Applicable Contract Drawing and Detail number, products, units and assemblies, and system or equipment identification or tag numbers.
 - b. Equipment and Component Title: Identical to title shown on the Drawings.
 - c. Critical field dimensions and relationships to other critical features of Work. Note dimensions established by field measurement.
 - d. Project-specific information drawn accurately to scale.
2. Manufacturer's standard schematic drawings and diagrams as follows:
 - a. Modify to delete information that is not applicable to the Work.
 - b. Supplement standard information to provide information specifically applicable to the Work.
3. Product Data: Provide as specified in individual Specifications.
4. Foreign Manufacturers: The Project includes a Buy-American requirement as defined in the contract documents. If American products are not available, foreign products may be proposed. When proposed, include names and addresses of at least two companies that maintain technical service representatives close to Project.

C. Samples:

1. Copies: Two, unless otherwise specified in individual Specifications.
2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of quality. Attach label on unexposed side that includes the following:
 - a. Manufacturer name.
 - b. Model number.

- c. Material.
 - d. Sample source.
 - 3. Manufacturer's Color Chart: Units or sections of units showing full range of colors, textures, and patterns available.
 - 4. Full-size Samples:
 - a. Size as indicated in individual Specification section.
 - b. Prepared from same materials to be used for the Work.
 - c. Cured and finished in manner specified.
 - d. Physically identical with product proposed for use.
- D. Action Submittal Dispositions: Engineer will review, comment, stamp, and distribute as noted:
- 1. Approved:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal.
 - b. Distribution: Electronic.
 - 2. Approved as Noted:
 - a. Contractor may incorporate product(s) or implement Work covered by submittal, in accordance with Engineer's notations.
 - b. Distribution: Electronic.
 - 3. Revise and Resubmit:
 - a. Contractor may not incorporate product(s) or implement Work covered by submittal. Make corrections or obtain missing portions, and resubmit.
 - b. Contractor shall maintain a log of all comments including Contractor's disposition of each comment. The Comment Log shall be returned with resubmittals and included in Contractor's monthly report.
 - c. Distribution: Electronic.
 - 4. Rejected:
 - a. Contractor may not incorporate product(s) or implement Work covered by submittal.
 - b. Distribution: Electronic.

1.04 INFORMATIONAL SUBMITTALS

- A. General:
- 1. Refer to individual Specification sections for specific submittal requirements.
 - 2. Engineer will review each submittal. If submittal meets conditions of the Contract, Engineer will forward copy to appropriate parties. If Engineer determines submittal does not meet conditions of the Contract and is therefore considered unacceptable, Engineer will require that submittal be corrected and resubmitted.

B. Certificates:

1. General:
 - a. Provide notarized statement that includes signature of entity responsible for preparing certification.
 - b. Signed by officer or other individual authorized to sign documents on behalf of that entity.
2. Welding: In accordance with individual Specification sections.
3. Installer: Prepare written statements on manufacturer's letterhead certifying installer complies with requirements as specified in individual Specification section.
4. Material Test: Prepared by qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
5. Certificates of Successful Testing or Inspection: Submit when testing or inspection is required by Laws and Regulations or governing agency or specified in individual Specification sections.
6. Manufacturer's Certificate of Compliance: In accordance with Section 01 61 00, Common Product Requirements.

C. Manufacturer-design Data:

1. Written and graphic information.
2. List of assumptions.
3. List of performance and design criteria.
4. Summary of loads or load diagram, if applicable.
5. Calculations.
6. List of applicable codes and regulations.
7. Name and version of software.
8. Information requested in individual Specification section.

D. Manufacturer's Instructions: Written or published information that documents manufacturer's recommendations, guidelines, and procedures in accordance with individual Specification section.

E. Operation and Maintenance Data: As required in individual Specification sections.

F. Quality Control Documentation: As required in individual Specification sections.

G. Schedules:

1. Schedule of Submittals: Prepare separately or in combination with Progress Schedule.
 - a. Show for each, at a minimum, the following:
 - 1) Specification section number.

- 2) Identification by numbering and tracking system as specified under Paragraph Transmittal of Submittal.
 - 3) Estimated date of submission to Engineer, including reviewing and processing time.
 - b. On a monthly basis, submit updated Schedule of Submittals to Engineer if changes have occurred or resubmittals are required.
- H. Submittal review does not change the terms of the Contract. Submittal review does not alleviate the contractor from meeting all terms and conditions as outlined in the Specifications, Drawings, plans, etc.
- I. Special Guarantee: Supplier's written guarantee as required in individual Specification sections.
- J. Statement of Qualification: Evidence of qualification, certification, or registration as required in Contract Documents to verify qualifications of professional land surveyor, engineer, materials testing laboratory, specialty Subcontractor, trade, Specialist, consultant, installer, and other professionals.
- K. Submittals Required by Laws, Regulations, and Governing Agencies:
 1. Promptly submit notifications, reports, certifications, payrolls, and otherwise as may be required, directly to the applicable federal, state, or local governing agency or their representative.
 2. Transmit to Engineer for Owner's records one copy of correspondence and transmittals (to include enclosures and attachments) between Contractor and governing agency.
- L. Test, Evaluation, and Inspection Reports:
 1. General: Shall contain signature of person responsible for test or report.
 2. Factory:
 - a. Identification of product and Specification section, type of inspection or test with referenced standard or code.
 - b. Date of test, Project title and number, and name and signature of authorized person.
 - c. Test results.
 - d. If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
 - e. Provide interpretation of test results, when requested by Engineer.
 - f. Other items as identified in individual Specification sections.
 3. Field:
 - a. As a minimum, include the following:
 - 1) Project title and number.
 - 2) Date and time.
 - 3) Record of temperature and weather conditions.

- 4) Identification of product and Specification section.
- 5) Type and location of test, Sample, or inspection, including referenced standard or code.
- 6) Date issued, testing laboratory name, address, and telephone number, and name and signature of laboratory inspector.
- 7) If test or inspection deems material or equipment not in compliance with Contract Documents, identify corrective action necessary to bring into compliance.
- 8) Provide interpretation of test results, when requested by Engineer.
- 9) Other items as identified in individual Specification sections.

M. Testing and Startup Data: In accordance with individual Specification sections.

N. Training Data: In accordance with Section 01 43 33, Manufacturers Field Services, and individual Specification sections.

1.05 SUPPLEMENTS

A. The supplements listed below, following “End of Section”, are part of this Specification.

1. Project Specific Submittal Register.
2. Project Specific Records Management Information.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 61 00
COMMON PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 DEFINITIONS

- A. Owner or SWBNO refers to Sewerage and Water Board of New Orleans.
- B. Engineer or Owner's Engineer refers to Jacobs Engineering Group (Jacobs) or POWER Engineers (POWER).
- C. Contractor refers to any and all individuals, companies, or entities performing construction activities related to the demolition, installation, excavation, startup, testing and commissioning of equipment, structures, or systems as specified.
- D. Packager refers to the entity that coordinates and repackages the equipment from each OEM for the Work, generally referred to as Supplier.
- E. OEM or Manufacturer refers to the Original Equipment Manufacturer, generally referred to as Supplier.
- F. Vendor refers to the entity that represents the OEM for various services, generally referred to as Supplier.
- G. Supplier refers to Packager, OEM or Vendor.
- H. Commissioning Agent/Representative is an independent entity that is responsible for the commissioning of the Work.
- I. Drawings: Drawings includes all technical drawings and documentation used to define the system (or systems) and equipment specified herein or in other Sections for the Work.
- J. Contract Documents refer to the project's commercial terms and conditions as well as all conformed Drawings and Documentation.
- K. Work refers to the Project Scope of Work paragraph in Section 01 11 01, Project Summary of Work.
- L. Products:
 - 1. New items for incorporation in the Work, whether purchased by Contractor or Owner for the Project, or taken from previously purchased stock, and may also include existing materials or components required for reuse.

2. Includes the terms material, equipment, machinery, components, subsystem, system, hardware, software, and terms of similar intent and is not intended to change meaning of such other terms used in Contract Documents, as those terms are self-explanatory and have well recognized meanings in construction industry.
3. Items identified by manufacturer's product name, including make or model designation, indicated in manufacturer's published product literature, that is current as of the date of the Contract Documents.

1.02 PROJECT ACRONYMS

ANSI	American National Standards Institute
ASA	Acoustical Society of America
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATC	Air Throat Connection
AWG	American Wire Gauge
AWS	American Welding Society
BOP	Balance of Plant
BPVC	Boiler Pressure Vessel Code
CENELEC	European Committee for Electrotechnical Standardization
CFR	Code of Federal Regulations
CPT	Control Power Transformer
CT	Current Transformer
CTG	Combustion Turbine Generator
DIN	Deutsches Institut für Normung e.V. (German Institute for Standardization)
ECS	Electrical Control System
EMC	Electromagnetic Compatibility
EN	European Standard
ESO	European Standardization Organization
FO	Fiber Optic
HMGP	Hazard Mitigation Grant Program
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IGBT	Insulated-Gate Bipolar Transistor
kCMIL	(kilo = 1,000) Circular Mils
kg	kilogram
kV	Kilovolt
kVA	Kilovolt-Ampere
kW	Kilowatt
MV	Medium Voltage
MVA	Megavolt-Ampere
MW	Megawatt

NEHRP	National Earthquake Hazards Reduction Program
NEMA	National Electrical Manufacturers Association
NESC	National Electrical Safety Code
NEC	National Electrical Code
NFPA	National Fire Protection Association
PCS	Plant Control System
PDCS	Power Distribution Control System
PF	Power Factor
PLC	Programmable Logic Controller
PT	Potential Transformer
R	Resistance
RMS	Root Mean Square
RIV	Radio Influence Voltage
RTAC	Real-Time Automation Controller
RTU	Remote Terminal Unit
SA	Surge Arrester
SCADA	Supervisory Control and Data Acquisition
SFC	Static Frequency Converter
SWB	Sewerage & Water Board
SWBNO	Sewerage & Water Board of New Orleans
SWC	Surge Withstand Capability
THD	Total Harmonic Distortion
UL	(formerly known as Underwriters Laboratory)
V	Volt
VAC	Volts (Alternating Current)
VAR	Volt-Amp Reactance
VDC	Volts (Direct Current)
X	Reactance (Capacitive or Inductive)
XFMR	Transformer
Z	Impedance

1.03 DESIGN REQUIREMENTS

- A. Where Contractor design is specified, design of installation, systems, equipment, and components, including supports and anchorage, shall be in accordance with provisions of 2015 International Building Code (IBC) by International Code Council.

B. Contractor shall plan and perform work in accordance with these site conditions:

1. Temperature and Precipitation:

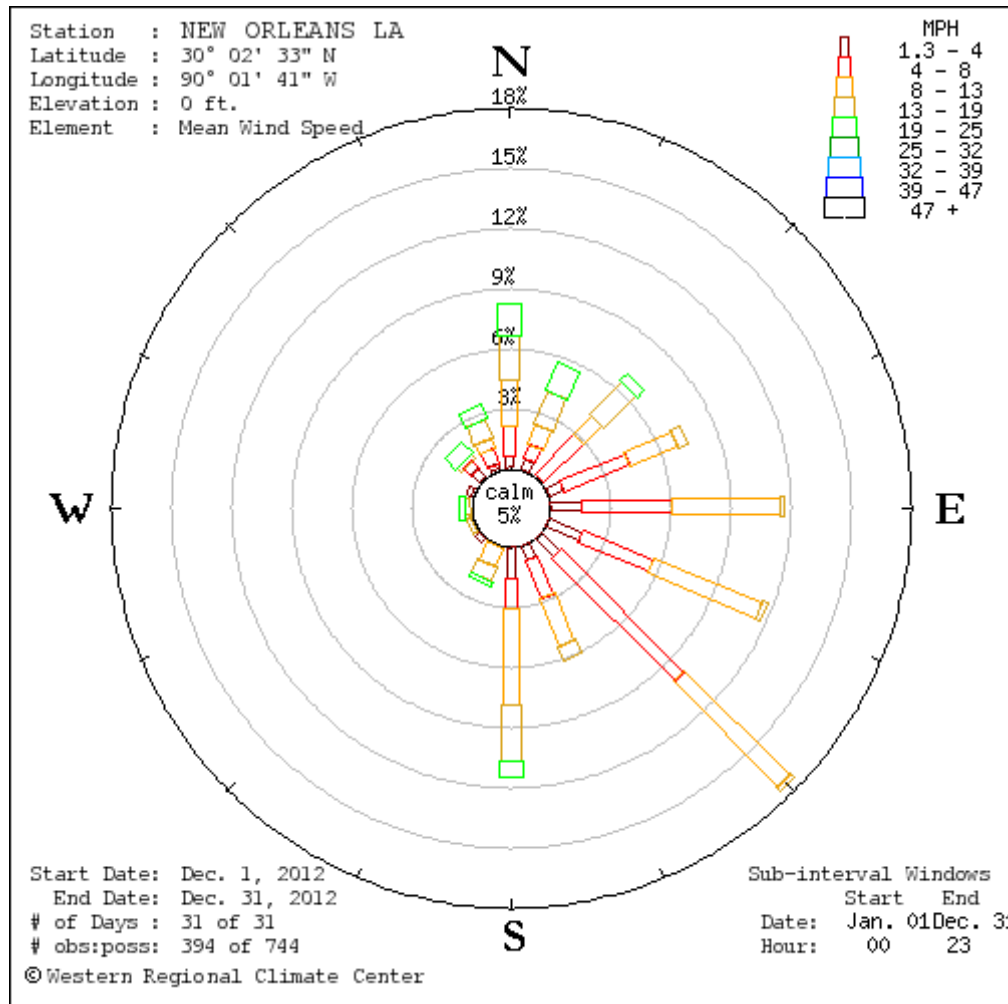
Parameter	Value and Unit
Temperature and Humidity:	
Mean annual dry bulb (DB) temperature	68.6 degrees F
Mean annual wet bulb (WB) temperature	63.3 degrees F
Mean summer dry bulb (DB) temperature	80.9 degrees F
Mean summer wet bulb (WB) temperature	74.9 degrees F
Mean winter season dry bulb (DB) temperature	56.7 degrees F
Mean winter season wet bulb (WB) temperature	52.6 degrees F
Mean Barometric Pressure	14.609 psia
Plant Elevation	4 feet above sea level
Design Conditions:	
Indoor Design Temperature (DB) for Equipment Design	122 degrees F
Design low temperature (DB) for Equipment Design	12 degrees F
Summer Ambient Design Conditions	97.0 degrees F, 54.2 percent RH
Precipitation and Snow:	
Average monthly rain fall	5.2 inches
Average annual rain fall	62.44 inches
Highest average monthly rain fall	6.77 inches (June and September)
100-year, 1-hour rainfall	9.75 inches
Snow fall annual average	0 inches

- 2. Wind Speeds:
 - a. Structures shall be designed for wind loads in accordance with ASCE 7-16 for Orleans Parish and the following parameters:

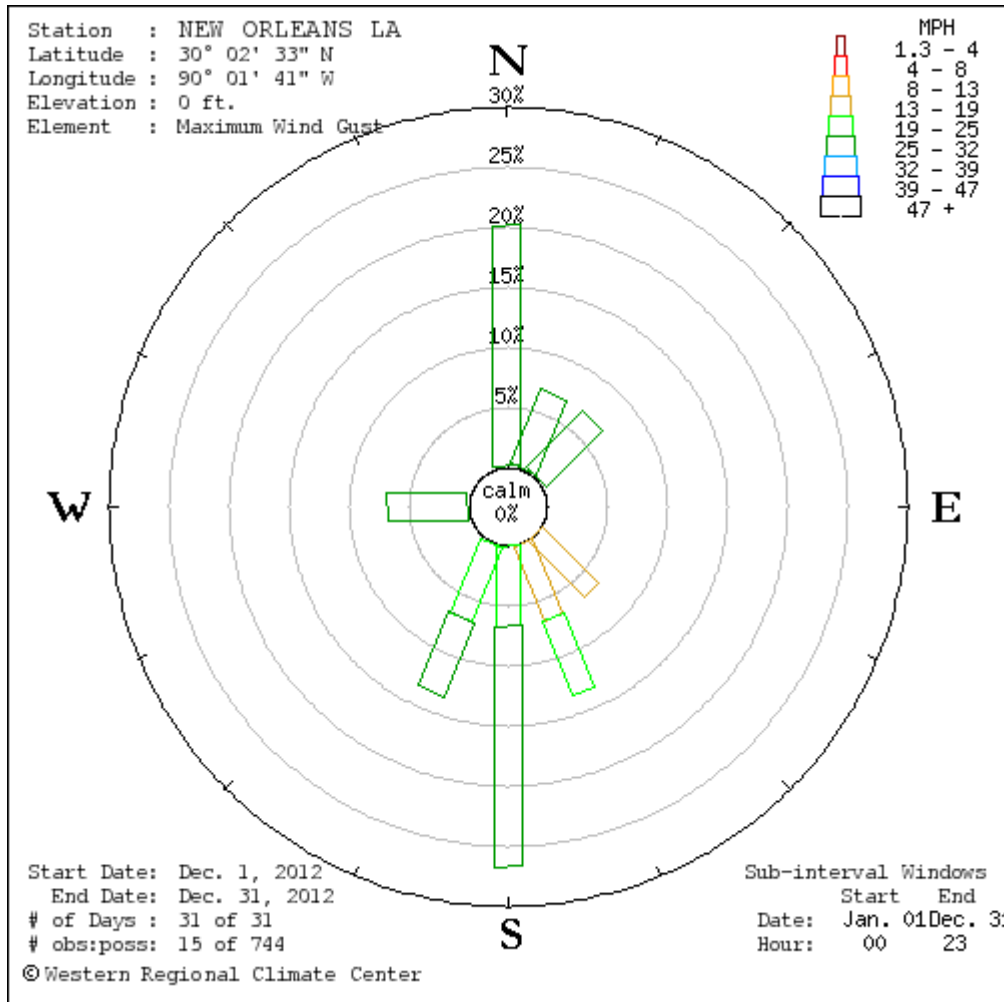
Parameter	Value and Unit
Ultimate Design Wind Speed	157 MPH
Exposure Category	C
Risk Category	IV Essential Facility per Table 1604.5

- b. The following USGS Wind Rose Diagram is from New Orleans, LA.

- 1) Mean Wind Speeds:



2) Maximum Wind Speeds:



1.04 SEISMIC DESIGN CRITERIA

- A. Structures shall be designed for seismic loads in accordance with the ASCE 7-16 for Orleans Parish and the following parameters:

Parameter	Value and Unit
Site soil Class	E
Seismic Design Category	D
Importance Factor (IE)	1.5
Risk Category	IV Essential Facility per Table 1604.5
SS	0.086g
S1	0.053g
S _{DS}	0.137g
S _{D1}	0.149g

1.05 PREPARATION FOR SHIPMENT

- A. For factory assembled products, mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable protective coating.
- B. Package products to facilitate handling and protect from damage during shipping, handling, and outdoor storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, name of Project and Contractor, equipment number, and approximate weight. Include complete packing list and bill of materials with each shipment.
- C. Extra Materials, Special Tools, Test Equipment, and Expendables:
 - 1. Furnish as required by individual Specifications.
 - 2. Schedule:
 - a. Ensure that shipment and delivery occurs concurrent with shipment of associated equipment.
 - b. Transfer to Owner shall occur immediately subsequent to Contractor's acceptance of equipment from Supplier.
 - 3. Packaging and Shipment:
 - a. Package and ship extra materials and special tools to avoid damage during long term outdoor storage in original cartons insofar as possible, or in appropriately sized, hinged-cover, wood, plastic, or metal box.
 - b. Prominently displayed on each package, the following:
 - 1) Manufacturer's part nomenclature and number, consistent with Operation and Maintenance Manual identification system.
 - 2) Applicable equipment description.
 - 3) Quantity of parts in package.
 - 4) Equipment manufacturer.
 - 4. Deliver materials to Site.
 - 5. Notify Owner upon arrival for transfer of materials.
 - 6. Replace extra materials and special tools found to be damaged or otherwise inoperable at time of transfer to Owner.
- D. Request a minimum 7-day advance notice of shipment from manufacturer.
- E. Factory Test Results: Reviewed and accepted by Engineer before product shipment as required in individual Specification sections.

1.06 DELIVERY AND INSPECTION

- A. Deliver products in accordance with accepted current Progress Schedule and coordinate to avoid conflict with the Work and conditions at Site. Deliver anchor bolts and templates sufficiently early to permit setting prior to placement of structural concrete.
- B. Deliver products in undamaged condition, in manufacturer's original container or packaging, with identifying labels intact and legible. Include on label, date of manufacture and shelf life, where applicable.
- C. Unload products in accordance with manufacturer's instructions for unloading or as specified. Record receipt of products at Site. Promptly inspect for completeness and evidence of damage during shipment.
- D. Remove damaged products from Site and expedite delivery of identical new undamaged products, and remedy incomplete or lost products to provide that specified, so as not to delay progress of the Work.

1.07 HANDLING, STORAGE, AND PROTECTION

- A. Handle and store products in accordance with manufacturer's written instructions and in a manner to prevent damage. Store in approved storage yards or sheds. Provide manufacturer's recommended maintenance during storage, installation, and until products are accepted for use by Owner.
- B. Manufacturer's instructions for material requiring special handling, storage, or protection shall be provided prior to delivery of material.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections (as specified by the Supplier's written instructions) of stored products to ensure that products are maintained under specified conditions, and free from damage or deterioration. Keep running account of products in storage to facilitate inspection and to estimate progress payments for products delivered, but not installed in the Work.
- D. Store electrical, instrumentation, and control products, and equipment with bearings in weather-tight structures maintained above 60 degrees F. Protect electrical, instrumentation, and control products, and insulate against moisture, water, and dust damage. Connect and operate continuously space heaters furnished in electrical equipment.
- E. Store fabricated products above ground on blocking or skids and prevent soiling or staining. Store loose granular materials in well-drained area on solid surface to prevent mixing with foreign matter. Cover products that are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

- F. Store finished products that are ready for installation in dry and well-ventilated areas. Do not subject to extreme changes in temperature or humidity.
- G. After installation, provide coverings to protect products from damage due to traffic and construction operations. Remove coverings/protection when scope is completed and accepted by Owner/Engineer.
- H. Hazardous Materials: Prevent contamination of personnel, storage area, and Site. Meet requirements of product specification, codes, and manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL

- A. Provide manufacturer's standard materials suitable for service conditions, unless otherwise specified in the individual Specifications.
- B. Where product specifications include a named manufacturer, with or without model number, and also include performance requirements, named manufacturer's products must meet the performance specifications.
- C. Like items of products furnished and installed in the Work shall be end products of one manufacturer and of the same series or family of models to achieve standardization for appearance, operation and maintenance, spare parts and replacement, manufacturer's services, and implement same or similar process instrumentation and control functions in same or similar manner.
- D. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- E. Provide interchangeable components of the same manufacturer, for similar components, unless otherwise specified.
- F. Equipment, Components, Systems, and Subsystems: Design and manufacture with due regard for health and safety of operation, maintenance, and accessibility, durability of parts, and shall comply with applicable OSHA, state, and local health and safety regulations.
- G. Regulatory Requirement: Coating materials shall meet federal, state, and local requirements limiting the emission of volatile organic compounds and for worker exposure.

- H. Safety Guards: Provide for all belt or chain drives, fan blades, couplings, or other moving or rotary parts. Cover rotating part on all sides. Design for easy installation and removal. Use 16-gauge or heavier; galvanized steel, aluminum coated steel, or galvanized or aluminum coated 1/2-inch mesh expanded steel. Provide galvanized steel accessories and supports, including bolts. For outdoors application, prevent entrance of rain and dripping water.
- I. Authority Having Jurisdiction (AHJ):
 - 1. Provide the Work in accordance with NFPA 70, National Electrical Code (NEC). Where required by the AHJ, material and equipment shall be labeled or listed by a nationally recognized testing laboratory or other organization acceptable to the AHJ in order to provide a basis for approval under NEC.
 - 2. Materials and equipment manufactured within the scope of standards published by Underwriters Laboratories, Inc. shall conform to those standards and shall have an applied UL listing mark.
- J. Equipment Finish:
 - 1. Provide manufacturer's standard finish and color, except where specific color is indicated.
 - 2. If manufacturer has no standard color, provide equipment with finish as approved by Owner.
- K. Special Tools and Accessories: Furnish to Owner, upon acceptance of equipment, all accessories required to place each item of equipment in full operation. These accessory items include, but are not limited to, adequate oil and grease (as required for first lubrication of equipment after field testing), light bulbs, fuses, hydrant wrenches, valve keys, handwheels, chain operators, special tools, and other spare parts as required for maintenance.
- L. Lubricant: Provide initial lubricant recommended by equipment manufacturer in sufficient quantity to fill lubricant reservoirs and to replace consumption during testing, startup, and operation until final acceptance by Owner.
- M. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.
- N. Use or reuse of components and materials without a traceable certification is prohibited.

2.02 FABRICATION AND MANUFACTURE

A. General:

1. Manufacture parts to U.S.A. standard sizes and gauges.
2. Two or more items of the same type shall be identical, by the same manufacturer, and interchangeable.
3. Design structural members for anticipated shock and vibratory loads.
4. Use 1/4-inch minimum thickness for steel that will be submerged, wholly or partially, during normal operation.
5. Modify standard products as necessary to meet performance specifications.

B. Lubrication System:

1. Require no more than weekly attention during continuous operation.
2. Convenient and accessible; oil drains with bronze or stainless steel valves and fill-plugs easily accessible from the normal operating area or platform. Locate drains to allow convenient collection of oil during oil changes without removing equipment from its installed position.
3. Provide constant-level oilers or oil level indicators for oil lubrication systems.
4. For grease type bearings, which are not easily accessible, provide and install stainless steel tubing; protect and extend tubing to convenient location with suitable grease fitting.

2.03 SOURCE QUALITY CONTROL

- A. Where Specifications call for factory testing to be witnessed by Owner or Engineer, notify Owner and Engineer not less than 14 days prior to scheduled test date, unless otherwise specified.
- B. Calibration Instruments: Bear the seal of a reputable laboratory certifying instrument has been calibrated within the previous 12 months to a standard endorsed by the National Institute of Standards and Technology (NIST).
- C. Factory Tests: Perform in accordance with accepted test procedures and document successful completion.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect materials and equipment for signs of pitting, rust decay, or other deleterious effects of storage. Do not install material or equipment showing such effects. Remove damaged material or equipment from the Site and expedite delivery of identical new material or equipment. Delays to the Work resulting from material or equipment damage that necessitates procurement of new products will be considered delays within Contractor's control.

3.02 MANUFACTURER'S CERTIFICATE OF COMPLIANCE

- A. When so specified, a Manufacturer's Certificate of Compliance, a copy of which is attached to this section, shall be completed in full, signed by entity supplying the product, material, or service, and submitted prior to shipment of product or material or execution of the services.
- B. Engineer may permit use of certain materials or assemblies prior to sampling and testing if accompanied by accepted certification of compliance.
- C. Such form shall certify proposed product, material, or service complies with that specified. Attach supporting reference data, affidavits, and certifications as appropriate.
- D. May reflect recent or previous test results on material or product, if acceptable to Engineer.

3.03 INSTALLATION

- A. Equipment Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. No shimming between machined surfaces is allowed.
- C. Install the Work in accordance with NECA Standard of Installation, unless otherwise specified.
- D. Repaint painted surfaces that are damaged prior to equipment acceptance.
- E. Do not cut or notch any structural member or building surface without specific approval of Engineer.
- F. Handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's instructions, and as may be specified. Retain a copy of manufacturers' instruction at Site, available for review at all times.
- G. For material and equipment specifically indicated or specified to be reused in the Work:
 - 1. Use special care in removal, handling, storage, and reinstallation to assure proper function in the completed Work.
 - 2. Arrange for transportation, storage, and handling of products that require offsite storage, restoration, or renovation. Include costs for such Work in the Contract Price.

3.04 FIELD FINISHING

- A. In accordance with individual Specification sections.

3.05 ADJUSTMENT AND CLEANING

- A. Perform required adjustments, tests, operation checks, and other startup activities.

3.06 LUBRICANTS

- A. Fill lubricant reservoirs and replace consumption during testing, startup, and operation prior to acceptance of equipment by Owner.

3.07 SUPPLEMENTS

- A. The supplement listed below, following “END OF SECTION”, is part of this Specification.
 - 1. Form: Manufacturer’s Certificate of Compliance.

END OF SECTION

SWBNO

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MANUFACTURER'S CERTIFICATE OF COMPLIANCE

OWNER: _____ PRODUCT, MATERIAL, OR SERVICE
PROJECT NAME: _____ SUBMITTED: _____
PROJECT NO: _____

Comments: _____

I hereby certify that the above-referenced product, material, or service called for by the Contract for the named Project will be furnished in accordance with all applicable requirements. I further certify that the product, material, or service are of the quality specified and conform in all respects with the Contract requirements, and are in the quantity shown.

Date of Execution: _____, 20__

Manufacturer: _____

Manufacturer's Authorized Representative (*print*): _____

(Authorized Signature)

SWBNO

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**SECTION 01 77 00
CLOSEOUT PROCEDURES**

PART 1 GENERAL

1.01 SUBMITTALS

A. Informational Submittals:

1. Submit prior to application for final payment.
 - a. Record Documents: As required in General Conditions.
 - b. Approved Shop Drawings and Samples: As required in the General Conditions.
 - c. Special bonds, Special Guarantees, and Service Agreements.
 - d. Consent of Surety to Final Payment: As required in General Conditions.
 - e. Releases or Waivers of Liens and Claims: As required in General Conditions.
 - f. Releases from Agreements.
 - g. Final Application for Payment: Submit in accordance with procedures and requirements stated in Section 01 29 00, Payment Procedures.
 - h. Extra Materials: As required by individual Specification sections.

1.02 RECORD DOCUMENTS

A. Quality Assurance:

1. Furnish qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
2. Accuracy of Records:
 - a. Coordinate changes within record documents, making legible and accurate entries on each sheet of Drawings and other documents where such entry is required to show change.
 - b. Purpose of Project record documents is to document factual information regarding aspects of the Work, both concealed and visible, to enable future modification of the Work to proceed without lengthy and expensive Site measurement, investigation, and examination.
3. Make entries within 24 hours after receipt of information that a change in the Work has occurred.
4. Prior to submitting each request for progress payment, request Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in a deferral by Engineer to recommend whole or any part of Contractor's Application for Payment, either partial or final.

1.03 RELEASES FROM AGREEMENTS

- A. Furnish Owner written releases from property owners or public agencies where side agreements or special easements have been made, or where Contractor's operations have not been kept within the Owner's construction right-of-way.
- B. In the event Contractor is unable to secure written releases:
 - 1. Inform Owner of the reasons.
 - 2. Owner or its representatives will examine the Site, and Owner will direct Contractor to complete the Work that may be necessary to satisfy terms of the side agreement or special easement.
 - 3. Should Contractor refuse to perform this Work, Owner reserves right to have it done by separate contract and deduct cost of same from Contract Price or require Contractor to furnish a satisfactory bond in a sum to cover legal Claims for damages.
 - 4. When Owner is satisfied that the Work has been completed in agreement with Contract Documents and terms of side agreement or special easement, right is reserved to waive requirement for written release if: (i) Contractor's failure to obtain such statement is due to grantor's refusal to sign, and this refusal is not based upon any legitimate Claims that Contractor has failed to fulfill terms of side agreement or special easement, or (ii) Contractor is unable to contact or has had undue hardship in contacting grantor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 MAINTENANCE OF RECORD DOCUMENTS

- A. General:
 - 1. Promptly following commencement of Contract Times, secure from Engineer at no cost to Contractor, one complete set of Contract Documents. Drawings will be full size.
 - 2. Label or stamp each record document with title, "RECORD DOCUMENTS," in neat large printed letters.
 - 3. Record information concurrently with construction progress and within 24 hours after receipt of information that change has occurred. Do not cover or conceal Work until required information is recorded.

B. Preservation:

1. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.
2. Make documents and Samples available at all times for observation by Engineer.

C. Making Entries on the Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe change by graphic line and note as required.
 - a. Color Coding:
 - 1) Green when showing information deleted from the Drawings.
 - 2) Red when showing information added to the Drawings.
 - 3) Blue and circled in blue to show notes.
 2. Date entries.
 3. Call attention to entry by “cloud” drawn around area or areas affected.
 4. Legibly mark to record actual changes made during construction, including, but not limited to:
 - a. Depths of various elements of foundation in relation to finished first floor data if not shown or where depth differs from that shown.
 - b. Horizontal and vertical locations of existing and new Underground Facilities and appurtenances, and other underground structures, equipment, or Work. Reference to at least two measurements to permanent surface improvements.
 - c. Location of internal utilities and appurtenances concealed in the construction referenced to visible and accessible features of the structure.
 - d. Locate existing facilities, piping, equipment, and items critical to the interface between existing physical conditions or construction and new construction.
 - e. Changes made by Addenda and Field Orders, Work Change Directive, Change Order, and Engineer’s written interpretation and clarification using consistent symbols for each and showing appropriate document tracking number.
 5. Dimensions on Schematic Layouts: Show on record drawings, by dimension, the centerline of each run of items such as are described in previous subparagraph above.
 - a. Clearly identify the item by accurate note such as “cast iron drain,” “galv. water,” and the like.
 - b. Show, by symbol or note, vertical location of item (“under slab,” “in ceiling plenum,” “exposed,” and the like).
 - c. Make identification so descriptive that it may be related reliably to Specifications.

3.02 FINAL CLEANING

- A. At completion of the Work or of a part thereof and immediately prior to Contractor's request for certificate of Substantial Completion; or if no certificate is issued, immediately prior to Contractor's notice of completion, clean entire Site or parts thereof, as applicable.
1. Leave the Work and adjacent areas affected in a cleaned condition satisfactory to Owner and Engineer.
 2. Remove grease, dirt, dust, paint or plaster splatter, stains, labels, fingerprints, and other foreign materials from exposed surfaces.
 3. Repair, patch, and touchup marred surfaces to specified finish and match adjacent surfaces.
 4. Clean all windows.
 5. Clean and wax wood, vinyl, or painted floors.
 6. Broom clean exterior paved driveways and parking areas.
 7. Hose clean sidewalks, loading areas, and others contiguous with principal structures.
 8. Rake clean all other surfaces.
 9. Regrade/patch road.
 10. Replace air-handling filters and clean ducts, blowers, and coils of ventilation units operated during construction.
 11. Leave water courses, gutters, and ditches open and clean.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.

END OF SECTION

**SECTION 26 00 10
ELECTRICAL SUMMARY OF WORK**

PART 1 GENERAL

1.01 ELECTRICAL

- A. The West Power Complex Electrical and Control Cable Project, electrical scope of work (the “Work”) includes the manufacture and storage of power and control cables required for the successful integration of the equipment at the new West Power Complex.
- B. The Work under this Contract includes a cable management process which requires coordination with other SWBNO Contractors performing work at the project site. The various principle elements of the electrical Work by the Supplier include the following items:
 - 1. Production of all materials to complete the Work.
 - 2. Inventory management of cable material supply, including cable reel identification.
 - 3. Cut-to-length services and reel management services of all cable supplied under this Contract.
 - 4. Inspection and testing of all material supplied under this Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

- A. Timely production and processing of material supplied is extremely important for this project.

END OF SECTION

**SECTION 26 05 10
CABLE MANAGEMENT SPECIFICATION**

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification, together with applicable Data Sheets and/or Supplements, covers the technical requirements for the cable management services required to provide a just-in-time cable delivery and cut-to-length services.
- B. The Cable Management Supplier is expected to provide cable to improve cable supply economies and reduce cable supply-chain constraints associated with the cable installation contractor supplied cable.
- C. An aspect of the just-in-time cable management program is the cable installation contractor's requirement to limit project-site cable inventory to cable planned to be installed within thirty (30) days of project-site receipt to reduce aggregation of project-site cable inventory that is not actively planned to be installed.

1.02 REFERENCES

- A. The latest edition for all codes and standards referenced in this Specification shall be the edition in effect at the time of Contract Award.
- B. Industry Standards:
 - 1. None specified, see Related Section.
- C. Related Sections:
 - 1. Section 01 31 13, Project Coordination
 - 2. Section 01 33 00, Submittal Procedures
 - 3. Section 01 61 00, Common Product Requirements.
 - 4. Section 26 00 10, Electrical Summary of Work.
 - 5. Section 26 05 13, Medium Voltage Cable
 - 6. Section 26 05 19, Low Voltage Cable
 - 7. Section 27 13 23, Communications Optical Fiber Backbone Cabling
 - 8. Section 27 15 13, Communications Copper Horizontal Cabling
 - 9. Section 27 15 23, Communications Optical Fiber Horizontal Cabling
 - 10. Section 28 13 00, Security Systems
 - 11. Section 28 31 11, Addressable Fire Alarm System
- D. Cable Code Index – Supplement attached to this specification identifying the types of cable that the Supplier must be able to provide, if requested. Cables requiring CTL services are listed on the unit price bid form.

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- E. Cable Management Tracker (CMT) – Inventory management documentation. Supplement attached to this specification is included as an example identifying minimum requirements.
- F. Cable Reel Identification Label (CRL) - Supplement attached to this specification is included as an example identifying minimum requirements.
- G. Cable Delivery Request (CDR) – Supplement attached to this specification is included as an example identifying minimum requirements.

1.03 DEFINITIONS

- A. Drawings: Drawings includes all technical drawings and documents used to define the system(s) and equipment specified herein.
- B. CDR – Cable Delivery Request
- C. CMT – Cable Management Tracker
- D. CRL – Cable Reel Identification Label
- E. CTL – Cut-to-length and associated reel management services
- F. EDL – Engineer’s designed/routed length
- G. EPL – Engineer’s pull length: EDL + tails
- H. CCL – Contractor’s Cut Length
- I. FIL – Final Installed Length
- J. Waste = CCL - EDL

1.04 SUBMITTALS

- A. Supplier shall provide the following Action Submittals:
 - 1. Cable Storage Plan, including but not limited to
 - a. Cable storage location(s) with address
 - b. Cable storage quality control details
 - c. Cable storage security details
 - 2. Monthly cable inventory records specific to this project, utilizing Supplier’s standard inventory management software or attached CMT.
 - 3. Inspection and Test Plans.

1.05 QUALITY ASSURANCE

- A. The Supplier shall maintain a quality manual/system which meets the requirements of the applicable international quality system standard

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appropriate to the contracted Scope of Work throughout the duration of this Purchase Order as well as ISO 9000 requirements.

- B. The Supplier quality plan shall be issued for review and for monitoring during the Project. Reporting requirements must include the Owner/Engineer requirements and additional requirements as stated below.
- C. Requirements covered by this Purchase Order/Specification shall apply to lower tier subcontractors and vendors, including Owner/Engineer's access (accompanied by Supplier) to facilities and records.
- D. All materials and hardware to be furnished and all Work to be performed under this Specification shall be subject to review, inspection, and testing as described below.

1.06 WARRANTY AND GUARANTEES

- A. Furnish Supplier's extended guarantee or warranty with Owner named as beneficiary in writing as special guarantee.
- B. The Supplier shall warrant that the equipment shall be supplied in accordance with these specifications and shall perform as described herein.
- C. The Supplier shall warrant that the material provided shall be free from defects in materials and workmanship for a period of 12 months after acceptance by Owner.
- D. The Supplier shall repair or provide a replacement for any defective material under the warranty, provided that any such defect was not the result of misuse of the material by the Owner or the Owner's representative.

PART 2 PRODUCTS

2.01 MATERIAL AND SERVICES TO BE FURNISHED BY SUPPLIER

- A. All cable per the Specifications, and as modified throughout the Contract period.
- B. All Cable Management services described herein.

2.02 CABLE MANAGEMENT – JUST-IN-TIME INVENTORY

- A. The Supplier shall maintain cable inventory in reserve in accordance with stated production schedule described elsewhere. 'In reserve' shall mean available for preparation-for-shipment as defined herein and not subject to commitment to others, ie committed for the Work.

- B. The Supplier shall maintain cable inventory in a cable manufacturer's compliant storage state, secure, and separate from general cable inventory in accordance with the approved Cable Storage Plan.
- C. The Supplier managed cable inventory shall be accessible for preparation-for-shipment within three (3) business days from Supplier receipt of Cable Delivery Request (CDR) requisition.
- D. Inventory services include cable storage at a location not to exceed 75 miles of the Owner's Site.

2.03 CABLE MANAGEMENT – CUT-TO-LENGTH SERVICE

- A. The Supplier shall provide cut-to-length (CTL) and associated reel management services for those cables identified for CTL service.
- B. A nominal length of 500-feet is considered for estimating purposes, but actual cut lengths will be provided by the installation contractor.
- C. The Supplier takes all risk for unusable portions of residual cable subject to CTL services.

2.04 CABLE MANAGEMENT – CABLE REEL IDENTIFICATION

- A. Supplier shall label each cable reel per the Cable Reel Label template.
- B. Cable reel identification label shall be durable to withstand one (1) year of cable manufacture's compliant storage. Cable reel identification label shall be sufficiently affixed to cable reel on both sides and not hinder cable reel handling.

2.05 CABLE MANAGEMENT – CABLE REEL RETURN

- A. Supplier shall indicate on CDR if cable reel return is required.
- B. Cable reels identified for return shall include a sixty (60) calendar day on-site maximum.

PART 3 EXECUTION

3.01 SOURCE QUALITY CONTROL

- A. Inspection and Testing
 - 1. The Owner or Owner/Engineer reserves the right to inspect cable storage facilities with a minimum of seven (7) days advance notice.
 - 2. The Owner or Owner/Engineer reserves the right to witness Supplier testing.

- B. An Inspection and Test Plan (ITP) shall be provided that identifies the standard non-destructive inspections and tests to be performed during storage and as required for cables subject to CTL service.
 - 1. Based on the ITP the Owner or Owner's Representative may elect to witness shop testing.
 - 2. CDR shall document confirmation of intended testing per ITP.

3.02 SUPPLIER'S SERVICES

- A. Provide Supplier's services as follows:
 - 1. Cut-to-length Services
 - a. Contractor is required to submit CDR paperwork to the Supplier with at least 72 hours (3 business days) advanced notice.
 - b. Supplier, shall provide cut-to-length and associated reel management services.
 - c. An important aspect of the cut-to-length service is the disposition of residual cable from master reel or Supplier bulk inventory, where the Owner is not liable for unusable residual cable. Unusable residual cable is any cable not of sufficient length to be utilized for the Work. The Supplier is responsible for optimizing cable 'harvesting' from available inventory when providing cut-to-length services.
 - 2. Packaging of cables for shipment as required by appropriate cable specification.
 - 3. Delivery coordination of materials to Owner's Site, unless otherwise arranged by Owner or Owner's Representative.

3.03 CABLE INVENTORY MANAGEMENT

- A. No additional fees shall be levied for cable inventory management for cable within the contracted quantities.
- B. Cable not requisitioned to the Work shall be available for a predetermined restocking fee, unless otherwise noted.
- C. Supplier shall provide weekly cable CMT updates and coordinated planning for incremental project execution projections. A minimum of three (3) week, eight (8) week / two (2) month, and six (6) month lookaheads. The goal / objective of these updates and coordinated planning activities is to mitigate any supply constraints. The Owner will work with cable installation contractor(s) to provide meaningful cable utilization projections to support the coordinated planning.

3.04 SUPPLEMENTS

A. The supplements listed below, included following “END OF SECTION,” are part of this Specification Section.

1. Cable Code Index
2. Cable Management Tracker (CMT) Example
3. Cable Reel Identification Label (CRL) Example
4. Cable Delivery Request Form (CDR) Example

END OF SECTION

CABLE CODE INDEX

Cable Code#	Cable Description	Specification
B01SXLTMF	1 x SX LOOSE TUBE MULTIMODE FIBER OPTIC CABLE	27.13.23
B01SXTBMMF	1 x SX TIGHT BUFFER MULTIMODE FIBER OPTIC CABLE	27.13.23
B02ACSDCOS	ACS DOOR CONTACT 2/C 300V OVERALL SHIELD	28.13.00
B04TP023CAT6A	4 SHIELDED TWISTED PAIR #23 CAT6A PATCH CORD	27.13.23
B16ACSCRDOS	ACS CR DOOR 16/C 300V OVERALL SHIELD	28.13.00
B18ACSCRIOOS	ACS CR IN/OUT 18/C 300V OVERALL SHIELD	28.13.00
C01008SIS	1/C #8 600V SIS	26.05.19
C01010SIS	1/C #10 600V SIS	26.05.19
C01012	1/C #12 600V	26.05.19
C01012SIS	1/C #12 600V SIS	26.05.19
C01014	1/C #14 600V	26.05.19
C01014SIS	1/C #14 600V SIS	26.05.19
C02010	2/C #10 600V	26.05.19
C02012	2/C #12 600V	26.05.19
C02014	2/C #14 600V	26.05.19
C03010	3/C #10 600V	26.05.19
C03012	3/C #12 600V	26.05.19
C03014	3/C #14 600V	26.05.19
C04008	4/C #8 600V	26.05.19
C04010	4/C #10 600V	26.05.19
C04012	4/C #12 600V	26.05.19
C04014	4/C #14 600V	26.05.19
C05014	5/C #14 600V	26.05.19
C07010	7/C #10 600V	26.05.19
C07014	7/C #14 600V	26.05.19
C09014	9/C #14 600V	26.05.19
C12014	12/C #14 600V	26.05.19
D01SMFP	1 FIBER SINGLE MODE FIBER OPTIC PATCH CABLE	27.13.23
D01SXLTSMF	1 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23
D01SXTBSMF	1 x SX TIGHT BUFFER SINGLE MODE FIBER OPTIC CABLE	27.13.23
D04SXLTSMF	4 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23
D04SXTBSMF	4 x SX TIGHT BUFFER SINGLE MODE FIBER OPTIC CABLE	27.13.23
D04TP023CAT6A	4 SHIELDED TWISTED PAIR #23 CAT6A PATCH CORD	27.13.23
D04TP024	4 TWISTED PAIR #24	27.13.23
D04TP024CAT5E	4 SHIELDED TWISTED PAIR #24 CAT5E PATCH CORD	27.13.23
D04UTP023CAT6A	4 UNSHIELDED TWISTED PAIR #23 CAT6A PATCH CORD	27.13.23
D04UTP024CAT5E	4 UNSHIELDED TWISTED PAIR #24 CAT5E PATCH CORD	27.13.23
D06006MMF	6 FIBER MULTIMODE	27.13.23
D08SXLTSMF	8 x SX LOOSE TUBE SINGLE MODE FIBER OPTIC CABLE	27.13.23
D08SXTBSMF	8 x SX TIGHT BUFFER SINGLE MODE FIBER OPTIC CABLE	27.13.23
D12006MMF	12 FIBER MULTIMODE	27.13.23
F02014FPLP	2/C #14 SOLID 300V FPLP	28.31.11
F02018FPLP	2/C #18 SOLID 300V FPLP	28.31.11
F03010AFR	3/C #10 300V ARMORED FIRE RESISTANT CABLE	28.31.11
F08014AFR	8/C #14 300V ARMORED FIRE RESISTANT CABLE	28.31.11
G01006SDBC	1/C #6 SOFT DRAWN BARE COPPER	26.05.19
G01008I	1/C #8 INSULATED GROUND CABLE	26.05.19
G011/0I	1/C #1/0 INSULATED GROUND	26.05.19
G01250I	1/C 250MCM INSULATED GROUND	26.05.19
G014/0I	1/C #4/0 INSULATED GROUND	26.05.19

CABLE CODE INDEX

Cable Code#	Cable Description	Specification
G014/0SDBC	1/C #4/0 SOFT DRAWN BARE COPPER	26.05.19
H01250S	1/C 250MCM 25KV SHIELDED	26.05.13
H01750S	1/C 750MCM 25KV SHIELDED	26.05.13
J01002S	1/C #2 5KV SHIELDED	26.05.13
J01006S	1/C #6 5KV SHIELDED	26.05.13
J011/0S	1/C #1/0 5KV SHIELDED	26.05.13
J012/0S	1/C #2/0 5KV SHIELDED	26.05.13
J01250S	1/C 250MCM 5KV SHIELDED	26.05.13
J014/0S	1/C #4/0 5KV SHIELDED	26.05.13
J01500S	1/C 500MCM 5KV SHIELDED	26.05.13
J01750S	1/C 750MCM 5KV SHIELDED	26.05.13
J03002GS	3/C #2 W/G 5KV SHIELDED	26.05.13
J031/0GS	3/C #1/0 W/G 5KV SHIELDED	26.05.13
J034/0GS	3/C #4/0 W/G 5KV SHIELDED	26.05.13
K01PR014OS	1 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19
K01PR016OS	1 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K01TR016OS	1 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K02PR014OS	2 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19
K02PR016OS	2 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K02TR016OS	2 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K04PR014OS	4 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19
K04PR016OS	4 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K04TR016OS	4 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K06PR014OS	6 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19
K06PR016OS	6 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K06TR016OS	6 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K12PR014OS	12 PR #14 NON-SH 600V OVERALL SHIELD	26.05.19
K12PR016OS	12 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K16PR016OS	16 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K16TR016OS	16 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K24PR016OS	24 PR #16 NON-SH 600V OVERALL SHIELD	26.05.19
K24TR016OS	24 TR #16 NON-SH 600V OVERALL SHIELD	26.05.19
L011/0	1/C #1/0 600V	26.05.19
L014/0	1/C #4/0 600V	26.05.19
L01444DLO	1/C 444MCM DLO 600V	26.05.19
L01500	1/C 500MCM 600V	26.05.19
L01535DLO	1/C 535MCM DLO 600V	26.05.19
L01646DLO	1/C 646MCM DLO 600V	26.05.19
L01750	1/C 750MCM 600V	26.05.19
L01777DLO	1/C 777MCM DLO 600V	26.05.19
L031/0G	3/C #1/0 W/G 600V	26.05.19
L03250G	3/C 250MCM W/G 600V	26.05.19
L034/0G	3/C #4/0 W/G 600V	26.05.19
L03500G	3/C 500MCM W/G 600V	26.05.19
P01002	1/C #2 600V	26.05.19
P01004	1/C #4 600V	26.05.19
P01006	1/C #6 600V	26.05.19
P01008	1/C #8 600V	26.05.19
P01010	1/C #10 600V	26.05.19
P01012	1/C #12 600V	26.05.19

CABLE CODE INDEX

Cable Code#	Cable Description	Specification
P02002G	2/C #2 W/G 600V	26.05.19
P02004G	2/C #4 W/G 600V	26.05.19
P02006G	2/C #6 W/G 600V	26.05.19
P02008G	2/C #8 W/G 600V	26.05.19
P02010	2/C #10 600V	26.05.19
P02010G	2/C #10 W/G 600V	26.05.19
P02012	2/C #12 600V	26.05.19
P02012G	2/C #12 W/G 600V	26.05.19
P02014	2/C #14 600V	26.05.19
P03002G	3/C #2 W/G 600V	26.05.19
P03004G	3/C #4 W/G 600V	26.05.19
P03006G	3/C #6 W/G 600V	26.05.19
P03008G	3/C #8 W/G 600V	26.05.19
P03010G	3/C #10 W/G 600V	26.05.19
S011/0S	1/C #1/0 15KV SHIELDED	26.05.13
S014/0S	1/C #4/0 15KV SHIELDED	26.05.13
S01500S	1/C 500MCM 15KV SHIELDED	26.05.13
S01750S	1/C 750MCM 15KV SHIELDED	26.05.13
T01PR016EOS	1 PR #16 TC TYPE E 600V OVERALL SHIELD	26.05.19
T01PR016JOS	1 PR #16 TC TYPE J 600V OVERALL SHIELD	26.05.19
T01PR016KOS	1 PR #16 TC TYPE K 600V OVERALL SHIELD	26.05.19
T01PR016KHOS	1 PR #16 TC TYPE K HIGH TEMP 600V OVERALL SHIELD	26.05.19
T08PR016KOS	8 PR #16 TC TYPE K 600V OVERALL SHIELD	26.05.19
U02012G	2/C #12 W/G SOLID 600V	26.05.19
U03012G	3/C #12 W/G SOLID 600V	26.05.19
X01PR016OS	1 PR #16 SH 600V OVERALL SHIELD	26.05.19
X01TR016OS	1 TR #16 SH 600V OVERALL SHIELD	26.05.19
X02PR016OS	2 PR #16 SH 600V OVERALL SHIELD	26.05.19
X02TR016OS	2 TR #16 SH 600V OVERALL SHIELD	26.05.19
X04PR016OS	4 PR #16 SH 600V OVERALL SHIELD	26.05.19
X04TR016OS	4 TR #16 SH 600V OVERALL SHIELD	26.05.19
X08PR016OS	8 PR #16 SH 600V OVERALL SHIELD	26.05.19
X16PR016OS	16 PR #16 SH 600V OVERALL SHIELD	26.05.19

CABLE MANAGEMENT TRACKER
SUMMARY

Client: SWBNO
Project: WEST POWER COMPLEX
Project No.
PO#

EXAMPLE FORM - SUPPLIER MAY USE THEIR STANDARD CMT
AND INVENTORY DOCUMENTATION FORMS

Updated last:

Quote Item #	PO ITEM#	MANUFACTURER P/N	Tag#	Description	Specification	Estimated Quantity	Purchased Quantity	Total In Supplier Inventory	Max with Tolerance	Total On Order	Total Shipped	%Shipped	Over/ Under	Allowable Tolerance	Status	Remarks
0	0	<SPN-zExample1>	zExample1	zExample 1	26.###.###.A	8,000	8,000	2,000	8,400	1,000	3,000	38%	-2,000	400		
0	0	<SPN-zExample2>	zExample2	zExample 2	26.###.###.A	4,000	4,000	4,000	4,200	0	0	0%	0	200		
0	0	<SPN-zExample3>	zExample3	zExample 3	26.###.###.A	2,000	2,000	500	2,100	500	1,500	75%	500	100		

CABLE MANAGEMENT TRACKER
MATERIAL SHIPPED

Record of Shipments

Client:
Project:
Project No.
PO#

EXAMPLE FORM - SUPPLIER MAY USE THEIR STANDARD CMT
AND INVENTORY DOCUMENTATION FORMS

Item #	PO ITEM#	SUB ITEM#	SPN	Tag#	Release#	Unit Price	Inv\$	Drum Number	Qty Requested	Qty Shipped	Parent LRB#	Children LRB#	Date Released	Date Shipped	SSO	SINV	Freight Line	Freight Equip	Comments
0	0	0	<SPN-zExample1>	zExample1			\$7,419.39		TOTAL	13,100									
					zSWBNO-1435.Ex01-01	\$ 0.1234	\$246.80	SWBNO-C01012-01	2,000		07720888	07895298	11/28/22	11/30/22	10311999	30360888	FreightLine_A	flatbed	
					zSWBNO-1435.Ex01-01	\$ 0.1234	\$259.14	SWBNO-C01012-02	2,100		07720000	07895384	11/28/22	11/30/22	10311911	30360666	FreightLine_B	N/A	
					zSWBNO-1435.Ex01-06	\$ 0.1234	\$617.00	SWBNO-C01012-03	5,000		07720222	07931373	01/08/23	01/08/23	10322971	30372000	FreightLine_C	flatbed	
					zSWBNO-1435.Ex01-15	\$ 0.1234	\$493.60	SWBNO-C01012-04	4,000		07720777	07987699	02/28/23	02/28/23	10341664	30393555	FreightLine_D	flatbed	
0	0	0	<SPN-zExample2>	zExample2			\$5,802.85		TOTAL	7,650									
					zSWBNO-1435.Ex01-01	\$ 0.0123	\$14.76	SWBNO-C01014-01	1,200		07720888	07895298	11/28/22	11/30/22	10311999	30360888	Topflight	N/A	
					zSWBNO-1435.Ex01-09	\$ 0.0123	\$12.30	SWBNO-C01014-02	1,000		07720000	07895384	11/28/22	11/30/22	10311911	30360666	Topflight	N/A	
					zSWBNO-1435.Ex01-12	\$ 0.0123	\$22.14	SWBNO-C01014-03	1,800		07720222	07931373	01/08/23	01/08/23	10322971	30372000	TFC	flatbed	
					zSWBNO-1435.Ex01-15	\$ 0.0123	\$44.90	SWBNO-C01014-04	3,650		07720777	07987699	02/28/23	02/28/23	10341664	30393555	TFC	flatbed	
0	0	0	<SPN-zExample3>	zExample3			\$5,708.75		TOTAL	12,500									
					zSWBNO-1435.Ex01-01	\$ 0.4567	\$1,552.78	SWBNO-C02012-01	3,400		07720888	07895298	11/28/22	11/30/22	10311999	30360888	Topflight	N/A	
					zSWBNO-1435.Ex01-06	\$ 0.4567	\$1,278.76	SWBNO-C02012-02	2,800		07720000	07895384	11/28/22	11/30/22	10311911	30360666	Topflight	N/A	
					zSWBNO-1435.Ex01-08	\$ 0.4567	\$593.71	SWBNO-C02012-03	1,300		07720222	07931373	01/08/23	01/08/23	10322971	30372000	TFC	flatbed	
					zSWBNO-1435.Ex01-22	\$ 0.4567	\$2,283.50	SWBNO-C02012-04	5,000		07720777	07987699	02/28/23	02/28/23	10341664	30393555	TFC	flatbed	

CABLE MANAGEMENT TRACKER
MATERIAL AVAILABLE

Material Availability List

Updated last:
Tolerance: -0,+5%

Client:
PO#
Project:
Project No.

EXAMPLE FORM - SUPPLIER MAY USE THEIR STANDARD CMT
AND INVENTORY DOCUMENTATION FORMS

Completed items

ACTION ITEMS

Items in **RED** are Non-stock
Today's date is:

Quote ITEM#	PO ITEM#	SUB ITEM#	Tag #	Description	CSDS	Ident Code	Supplier Part # (SPN)	CU WT/Mft	WT/MFT	Vendor	Quantity Ordered	Unit Price (MFT)	Original Put-up	Reel#	Release #01	Release #02	Release #03	Return to Supplier	Available Qty	Comments	
			zExample1	1/C #12, 600V			<SPN-zExample1> <SPN-> <SPN-> <SPN-> <SPN-> <SPN-> <SPN->				0	\$ 0.1000	500		500		500		500	0	
			zExample2	1/C #14, 600V			<SPN-zExample2> <SPN-> <SPN-> <SPN-> <SPN-> <SPN->				0	\$ 0.1000								0	
			zExample3	2/C #12, 600V			<SPN-zExample3> <SPN-> <SPN-> <SPN-> <SPN-> <SPN->				0	\$ 0.1000								0	
			C01012	1/C #12 600V			<SPN-C01012> <SPN-> <SPN-> <SPN-> <SPN-> <SPN->				0	\$ 0.1000								0	

Cable Management Cable Reel Identification Label

EXAMPLE FORM - SUPPLIER MAY USE THEIR STANDARD FORM
UTILIZING THE CATEGORIES LISTED HERE

SEWERAGE AND WATER BOARD OF NEW ORLEANS (SWBNO)

CABLE CODE:

REEL NO:

CABLE MANUFACTURER:

CABLE MANUFACTURER'S CABLE PART NUMBER:

CABLE MANUFACTURER'S CABLE DESCRIPTION:

CABLE MANUFACTURING QUALITY DOCUMENTATION/RUN/BATCH NUMBER:

DATE CABLE MANUFACTURED:

DATE CABLE PLACED ON REEL:

LENGTH OF CABLE ON REEL (FEET):

DRUM (INNER) CABLE LENGTH MARK NUMBER (FEET):

FLANGE (OUTER) CABLE LENGTH MARK NUMBER (FEET):

REEL INSPECTOR NAME AND REFERENCE NUMBER:

Cable Request Tracking Number (CMS RQNO) Reel Provided Under:

Cable Management Supplier Location (CMS LOCATION) Reel Supplied From:

Date Cable Reel Ready for Shipping at Cable Management Supplier Location (CMS READY DATE):

CONTRACTOR NAME:

CONTRACT NUMBER:

PROJECT NAME:

SITE LOCATION:

SEWERAGE AND WATER BOARD OF NEW ORLEANS (SWBNO)

CABLE CODE:

REEL NO:

Cable Management Cable Request Form

EXAMPLE FORM - CONTRACTOR MAY USE THEIR STANDARD FORM UTILIZING THE CATEGORIES LISTED HERE

CONTRACTOR NAME:
 CONTRACT NUMBER:
 PROJECT NAME:
 SITE LOCATION:

Cable Request Tracking Number (CMS RQNO):
 Cable Management Supplier Location (CMS LOCATION):
 Date Cable Required at Cable Management Supplier Location (CMS READY DATE):

	NAME	COMPANY	DATE
REQUESTED BY:			
APPROVED BY:			
ISSUED BY:			
RECEIVED BY:			

LINE #	QUANTITY	UNIT OF MEASURE	CABLE CODE	DESCRIPTION	CMS LOCATION	ISSUE REASON (INSTALL, RETURN, SALE, TRANSFER)	USAGE / PURPOSE (ACCOUNT, DRAWING, LOCATION)	REEL NO	COMMENTS
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									

SECTION 26 05 13
MEDIUM VOLTAGE CABLE

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification covers the requirements for the procurement of Medium Voltage Cable for systems operating at 2001 volts through 35,000 volts.

1.02 REFERENCES

- A. The material furnished shall be in accordance with, but not limited to, the following Codes and Standards.
1. American Society for Testing and Materials (ASTM):
 - a. B8, Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - b. B496, Compact Round Concentric-Lay-Stranded Copper Conductors.
 2. Insulated Cable Engineers Association (ICEA):
 - a. P-45-482, Short Circuit Performance of Metallic Shields and Sheaths on Insulated Cables.
 - b. P-46-426, Power Cable Ampacities.
 - c. P-54-440, Ampacities of Cables in Open-Top Cable Trays.
 - d. S-93-639, 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
 - e. T-26-465, Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test.
 - f. T-27-581, Test Methods for Extruded Dielectric Cables.
 - g. T-29-520, Conducting Vertical Cable Tray Flame Tests with Theoretical Heat Input Rate of 210,000 B.T.U./Hour.
 3. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C2, National Electrical Safety Code.
 - b. 383, Qualifying Class 1E Electric Cables and Field Splices for Nuclear Power Generating Stations (flame test requirements only).
 - c. 400, Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
 - d. 422, Guide for the Design and Installation of Cable Systems in Power Generating Stations.
 - e. 532, Guide for Selecting and Testing Jackets for Power, Instrumentation, and Control Cables.
 - f. 575, Guide for the Application of Sheath-Bonding Methods for Single-Conductor Cables and the Calculation of Induced Voltages and Currents in Cable Sheaths.

- g. 576, Recommended Practice for Installation, Termination, and Testing of Insulated Power Cable as Used in Industrial and Commercial Applications.
- h. 666, Design Guide for Electric Power Service Systems for Generating Stations.
- i. 835, Standard Power Cable Ampacity Tables.
- j. 1185, Recommended Practice for Cable Installation in Generating Stations and Industrial Facilities.
- 4. National Electrical Manufacturers Association (NEMA): WC 74, 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy.
- 5. National Fire Protection Association (NFPA): 70, National Electrical Code.
- 6. UL: 1072, Medium-Voltage Power Cables.

B. Related Sections, as applicable to this specific project:

- 1. Section 01 11 01, Project Summary of Work.
- 2. Section 01 33 00, Submittal Procedures.
- 3. Section 26 00 00, Electrical General Requirements.
- 4. Section 26 00 10, Electrical Summary of Work.

1.03 SUBMITTALS

A. Documentation shall be submitted in accordance with Section 01 33 00, Submittal Procedures. In addition to the documents required by Section 01 33 00, Submittal Procedures, supply engineering data as listed below:

- 1. Supplier's data cut sheets.
- 2. Certified Factory Test Reports.
- 3. Supplier's installation instructions.
- 4. Recommended field tests.

PART 2 PRODUCTS

2.01 GENERAL

A. Acceptable Suppliers: single source manufacture is required for medium voltage cable specified in this section.

- 1. Okonite or approved alternate.
- 2. Furnish cable bearing UL label.

2.02 CABLE CONSTRUCTION

A. Single Conductor:

1. Soft-drawn, annealed copper conductors with Class “B” stranded.
2. Insulation: EPR insulation compounded and mixed by cable manufacturer, rated for 105 degrees C, with thickness appropriate for 133 percent insulation level, minimum thickness according to NEC Table 310.104(E).
3. Semi-conducting: strand and insulation shields of thermosetting compound.
4. Shield: helically applied Copper wire (concentric neutral-drain wire).
5. Jacket: UL listed “MV-105”, UV-rated, rated for use in cable tray, conduits, or underground ducts, in wet or dry locations.
6. Color coding of Medium Voltage (MV) cable shall be solid-black jacketed conductors with color tape wrapped around each terminated end of a conductor. Phase conductor color coding for Phase A, Phase B, and Phase C conductors shall be BROWN, ORANGE, and YELLOW, respectively. Neutral conductors, where applicable, shall also be solid-black jacketed with a GRAY tape wrapped around each terminated end of the conductor.

B. Multi-conductor:

1. Soft-drawn, annealed copper conductors Class “B” stranded.
2. EPR insulation compounded and mixed by cable manufacturer, rated for 105 degrees C, with thickness appropriate for 133 percent insulation level, minimum thickness according to NEC table 310.104(E).
Semi-conducting: strand and insulation shields of thermosetting compound.
3. Shield: helically applied Copper wire (concentric neutral-drain wire).
4. Ground: one overall bare grounding conductor rated according to UL 1072.
5. Jacket: one overall jacket UL listed “MV-105”, rated for use in cable tray.
6. Color coding of Medium Voltage (MV) cable shall be solid-black jacketed conductors with color tape wrapped around each terminated end of a conductor. Phase conductor color coding for Phase A, Phase B, and Phase C conductors shall be BROWN, ORANGE, and YELLOW, respectively. Neutral conductors, where applicable, shall also be solid-black jacketed with a GRAY tape wrapped around each terminated end of the conductor.

2.03 CABLE FLAME TEST

- A. All cables shall pass IEEE 1202 vertical tray 70,000 btu/hr flame test.

2.04 CABLE JACKET MARKINGS

- A. Conductor Size and Material.
- B. Insulation Type.
- C. Shield Type.
- D. Tray Cable Type TC.
- E. Voltage.
- F. Flame Test.
- G. Temperature Rating
- H. Date of Manufacture.
- I. Manufacturer's name
- J. Footage Markers.

PART 3 EXECUTION

3.01 PACKAGING AND SHIPPING

- A. Reel Construction:
 - 1. Standard non-returnable wood reels and meet requirements of NEMA WC 26. These reels, while using the most economic construction, must withstand shipping, normal handling in the field, and outdoor storage up to three years in all weather conditions. Supplier shall indicate if cable reel return is required.
 - 2. Reels 36 inches and larger must have steel arbor hole inserts.
 - 3. Plywood flange reels are not acceptable.
 - 4. Each reel of cable protected by a weather-resistant covering of suitable grade to meet the requirements for Class 4, extra-heavy duty physical protector in accordance with NEMA WC 26.
- B. Reel Identification:
 - 1. Each reel must have a visible waterproof tag on the outside of each flange.
 - 2. Tags shall be 4 inches by 6 inches and larger for a total of two tags per reel.
 - 3. Tags must include:
 - a. Job name.
 - b. Supplier and Supplier purchase order number.

- c. Purchase order line item number.
- d. Cable description.
- e. Cable code.
- f. Cable length.
- g. Sequential footage markers which match exposed ends.
- h. Gross weight of the reel.
- i. Supplier name.
- j. Non-repetitive reel number (matches packing slip).
- k. Custom reel identifier which will be provided to Supplier at the time of release for shipment.
- l. Reel storage requirements shall be shown on reel tag.

C. Delivery:

- 1. Reels must be transported and delivered standing on flanges.
- 2. If palletized, reels must be standing on flanges and strapped to pallet.
- 3. Cable reels must be delivered on flat bed only. Material must be tarped.
- 4. Each cable reel must have 3 feet exposed test lead on each end.
- 5. Medium voltage cable ends must be heat shrink capped.

D. Storage and Handling:

- 1. Storage: Protect cable from elements during storage.
- 2. Handling: Do not remove protective lagging from reels until ready to commence pulling operations.

END OF SECTION

SECTION 26 05 19
LOW VOLTAGE WIRE AND CABLE

PART 1 GENERAL

1.01 SUMMARY

- A. This Specification covers the technical and associated requirements for the procurement of Low Voltage Wire and Cable used on systems operating at 600 volts or less.

1.02 REFERENCES

- A. The material furnished shall be in accordance with, but not limited to, the following Codes and Standards:
1. American National Standards Institute (ANSI): TIA 568-C.2 Balanced Twisted-Pair Telecommunications Cabling and Components Standard.
 2. American Society for Testing and Materials (ASTM):
 - a. B3, Specification for Soft and Annealed Copper Wire for Electrical Purposes.
 - b. B8, Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
 - c. B33, Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes.
 - d. B172, Specification for Rope-Lay-Stranded Copper Conductors Having Bunch-Stranded Members, for Electrical Conductors.
 - e. B496, Specification for Compact Round Concentric-Lay-Stranded Copper Conductors.
 3. Insulated Cable Engineers Association (ICEA):
 - a. P-45-482, Short Circuit Performance of Metallic Shields and Sheaths on Insulated Cables.
 - b. P-54-440, Ampacities of Cables in Open-Top Cable Trays.
 - c. S-73-532, Standard for Control, Thermocouple Extension, and Instrumentation Cables.
 - d. S-90-661, Category 3, 5 and 5e Individually Unshielded Twisted Pair Indoor Cable for Use in General Purpose and LAN Communication Wiring.
 - e. S-95-658, Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
 - f. S-104-696, Indoor-Outdoor Optical Fiber Cable.
 - g. T-26-465, Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation, and Portable Cables for Test.
 - h. T-27-581, Test Methods for Extruded Dielectric Cables.

4. Institute of Electrical and Electronics Engineers (IEEE):
 - a. C2, National Electrical Safety Code.
 - b. 1202, Standard for Flame-Propagation Testing of Wire and Cables.
 - c. 422, Guide for Design of Cable Raceway for Electrical Generating Facilities.
5. National Electrical Manufacturers Association (NEMA):
 - a. WC 26, Binational Wire and Cable Packaging Standard.
 - b. WC 57, Standard for Control, Thermocouple Extension, and Instrumentation Cables.
 - c. WC 70, Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy.
 - d. HP 100, High Temperature Instrumentation and Control Cables.
6. National Fire Protection Association (NFPA): 70, National Electrical Code.
7. UL:
 - a. 44, Thermoset-Insulated Wires and Cables.
 - b. 1277, Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
 - c. 1581, Reference Standard for Electrical Wires, Cables, and Flexible Cords.
 - d. 1685, Vertical-Tray Fire-Propagation and Smoke-Release Test for Electrical and Optical-Fiber Cables.
 - e. 2225, Cables and Cable Fittings for Hazardous Locations.
 - f. 2250, Instrumentation Tray Cable.
 - g. E38916, Type MC-HL Cable.
 - h. VW-1, Vertical Wire Flame Test.

B. Related Sections, as applicable to this specific project:

1. Section 01 33 00, Submittal Procedures.
2. Section 26 00 00, Electrical General Requirements.
3. Section 26 00 10, Electrical Summary of Work.

1.03 DEFINITIONS

- A. Drawings: Drawings includes all technical drawings and documents used to define the system(s) and equipment specified herein.

1.04 SUBMITTALS

- A. Documentation shall be submitted in accordance with Section 01 33 00, Submittal Procedures. In addition to the documents required by Section 01 33 00, Submittal Procedures, supply engineering data as listed below:

1. Supplier's data cut sheets.
2. Certified Factory Test Reports.

3. Supplier's installation instructions.
4. Recommended field tests.

PART 2 PRODUCTS

2.01 GENERAL

- A. Acceptable Suppliers listed below (or Approved Alternates):
 1. Okonite.
 2. Southwire.
 3. General Cable.
 4. Corning.
 5. Prysmian (Pirelli).
 6. Houston Wire and Cable.
 7. Anixter.
 8. US Wire and Cable (distributor).
 9. Calvert.
 10. C.I.E.
- B. Furnish soft drawn, annealed copper, wire, cable (Class "B" Stranding), associated connectors, and termination hardware bearing UL label.
- C. Submit Product Data on each type of cable.

2.02 CABLE CONSTRUCTION

- A. Power Wire and Cable General Requirements:
 1. General: Conform to UL 83 (thermoplastic insulation), UL 44 (thermoset insulation) and ICEA S-95-658/NEMA WC70.
 - a. Multi-Conductor Cable: Rated 600 volts, with ground wire, conductor insulation [EPR or XLPE], NEC type XHHW-2 (90 degrees C wet/dry), having prescribed size and number of conductors, cabled together with an outer CPE, or XLP, or PVC jacket, per NEC and UL listed as Type TC suitable for tray installation.
 - b. Single-Conductor Cable: Rated 600 volts, conductor insulation XLPE, NEC type XHHW-2 (90 degrees C wet/dry), UL listed as Type TC suitable for tray installation. Cable #4/0 AWG and above may be without color code.
 - c. Ground Conductor: Rated 600 volts, conductor insulation PVC, NEC type TW (60 degrees C wet/dry), no jacket required.

2. Color coding:

Voltage	ØA	ØB	ØC	Neutral
< 250 volts	Black	Red	Blue	White
250 – 600 volts	Brown	Orange	Yellow	Natural Gray

- a. For specified insulations and jackets not manufactured with integral colors, use conductors with black insulation or jacket and color coding tape.
- b. Ground Conductors:
 - 1) For 6 AWG and smaller: Green.
 - 2) For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

B. Control Cable General Requirements:

- 1. General: Conform to UL 83 (thermoplastic insulation), UL 44 (thermoset insulation) and ICEA S-95-658/NEMA WC70.
 - a. Multi-Conductor Cable: Rated 600 volts, unshielded, with ground wire, conductor insulation XLPE, NEC type XHHW-2 (90 degrees C wet/dry), having prescribed size and number of conductors, cabled together with an outer CPE, or XLP, or PVC jacket, per NEC and UL listed as Type TC suitable for tray installation.
- 2. Color Coding: Per ICEA Method 1, Table E-2. Minimum conductor size No. 14 AWG.

C. Signal Cable General Requirements:

- 1. General: Type PLTC (Power Limited Tray Cable). Labeled and approved for use in cable tray. Conform to UL 83 (thermoplastic insulation), UL 44 (thermoset insulation) and ICEA S-95-658/NEMA WC70.
 - a. Multi-conductor:
 - 1) General: Rated 600 volts, conductor insulation XLPE 90 degrees C, single pair (pr.), triad (tri.), or quad (qd.).
 - 2) Single Pr., Tri., or Qd.: No. 16 AWG, stranded copper conductors, twisted and covered with a 100 percent aluminum-mylar shield, with drain wire and overall PVC or CPE jacket.
 - 3) Multiple Pr., Tri., or Qd.: Same as single construction except an overall aluminum-mylar shield in addition to individual shields.

- b. Thermocouple Extension Wire:
 - 1) Two 16 AWG solid alloy conductors matched and calibrated to ANSI MC96.1 type E, J, K, T, or other specific type indicated on the Drawings.
 - 2) Full coverage aluminum-mylar shield and drain wire.
 - 3) XLPE 90 degrees C conductor insulation and overall PVC or CPE jacket.
- c. Resistance Bulb Wiring (RTD):
 - 1) 3-Wire RTDs: No. 16 AWG, stranded copper conductors with a 100 percent aluminum-mylar triad shield, with drain wire, conductor insulation rated 90 degrees C and overall PVC or CPE jacket.
 - 2) 4-Wire RTDs: Two 16 AWG twisted pairs each with a 100 percent aluminum shield, with drain wire, conductor insulation rated 90° C and overall PVC or CPE jacket.
- 2. Category 5E High Speed Network Cable:
 - a. For copper network cables, reference the following specifications:
 - 1) 27 15 13 COMMUNICATIONS COPPER HORIZONTAL CABLING
- 3. Category 6A High Speed Network Cable:
 - a. For copper network cables, reference the following specifications:
 - 1) 27 15 13 COMMUNICATIONS COPPER HORIZONTAL CABLING
- 4. Fiber Optic Cable:
 - a. For fiber optic cables, reference the following specifications:
 - 1) 27 13 23 COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING
 - 2) 27 15 23 COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING
- 5. RS232:
 - a. For printer cables and fire panel communication to Alertus devices:
 - 1) RS232/423 Low Cap, #24-4c, FPO, O/A Foil+Braid, PVC Jkt, CM
- 6. Color Coding:
 - a. Signal Cables: Comply with ICEA S-82-552, "Method 9", Table E-2. In addition, number multiple pairs, triads, and quads.
 - b. Thermocouple Extension Wire: ANSI MC96.1 and ICEA S-82-552, Table E-4.
 - c. RTDs:
 - 1) 3-Wire: Black, White, and Red.
 - 2) 4-Wire: One pair red and black and other pair green and white.

- D. General-purpose building conductor used on interior lighting circuits and general-purpose branch circuits routed entirely in conduit shall be single conductor.
 - 1. Voltage rating: 600V.
 - 2. Conductor: Class B, solid or stranded, annealed, uncoated copper, minimum size No. 12 AWG.
 - 3. Insulation: PVC complying with physical and electrical requirements of UL for type THHN/THWN.
 - 4. Jacket: Overall clear nylon jacket applied over conductor insulation, UL-listed as gasoline and oil resistant.
 - 5. Provide conductor sizes No. 8 AWG and smaller in colors to match wire color-codes. Sizes No. 6 AWG and larger shall be color-coded with field-applied tape.
 - 6. Rated continuous operating temperature shall be 90 degrees C in wet and dry locations for operation at maximum 75 degrees C.

- E. Single-conductor, low-voltage power cable for motors, feeders, branch circuits, and DC circuits routed in conduit, duct bank, or cable tray:
 - 1. Voltage rating: 600V.
 - 2. Conductor: Annealed, bare copper, Class B, stranded, minimum size No. 12 AWG.
 - 3. Insulation: Ethylene propylene rubber (EPR), complying with physical and electrical requirements for NEC Type XHHW-2.
 - 4. Jacket: Flame-retardant, heat, moisture, and sunlight resistant; cross-linked low-smoke, non-halogen polyolefin (XLPO).
 - 5. Conductor sizes No. 8 AWG and smaller shall be provided in colors to match wire color-codes. Sizes No. 6 AWG and larger may be color-coded with field applied tape.
 - 6. Wire shall be identified by surface marking indicating manufacturer, conductor size, conductor material, voltage rating, UL symbol, and listed type.
 - 7. Cables smaller than No. 1/0 AWG shall be routed entirely in conduit and duct bank. Sizes No. 1/0 AWG and larger may be routed in cable tray, if so rated.
 - 8. Conductors shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and UL VW-1 vertical flame test.
 - 9. Temperature rating shall be 90 degrees C for normal operation in wet or dry locations.

- F. Multiconductor, low-voltage power cables for motors, feeders, and branch circuits routed in cable tray, conduit or duct bank:
 - 1. Voltage rating: 600V.

2. Conductors: Annealed, bare copper, Class B, stranded, minimum size No. 12 AWG.
 3. Insulation: Flame-retardant, cross-linked polyethylene (XLPE) or cross-linked polyolefin (XLPO), complying with physical and electrical requirements for NEC Type XHHW-2.
 4. Jacket: Flame-retardant, heat, moisture, and sunlight-resistant; cross-linked, low-smoke, non-halogen polyolefin (XLPO).
 5. Phase conductors shall be cabled together with Class B stranded, uncoated copper grounding conductor and fillers. Ground wire size shall comply with requirements of UL 1277.
 6. Cover cable assembly with helically applied polyester binder tape with minimum 10 percent overlap.
 7. Marking: Insulated phase conductors shall be black and shall have printed numbers in accordance with ICEA Method 4. Each cable shall be identified by means of surface ink printing indicating manufacturer, number of conductors, size, metal, voltage rating, and UL listing as suitable for cable tray use.
 8. Cables shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and individual conductors UL VW-1 vertical flame test.
 9. Conductors shall be temperature rated for 90 degrees C maximum continuous operating temperature in wet or dry locations.
- G. Multiconductor, low-voltage power cables for motors fed from adjustable speed drives, any installation.
1. Voltage rating: 600V.
 2. Conductors: Annealed, bare copper, Class B, stranded, minimum size No. 10 AWG.
 3. Insulation: Flame-retardant, cross-linked polyethylene (XLPE) complying with physical and electrical requirements for NEC Type XHHW-2.
 4. Jacket: Flame-retardant, polyvinyl chloride (PVC).
 5. Armor/shield: Continuously welded and corrugated high conductivity aluminum.
 6. Ground conductors: Three segmented Class B strand, annealed copper conductors sized to meet requirements of UL 1569.
 7. Marking: Insulated phase conductors shall be black and shall have printed numbers in accordance with ICEA Method 4. Each cable shall be identified by means of surface ink printing indicating manufacturer, number of conductors, size, metal, voltage rating, and UL listing.
 8. Cables shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and individual conductors UL-approved and marked with FT-4 designation.
 9. Conductors shall be temperature rated for 90 degrees C maximum continuous operating temperature in wet or dry locations.

- H. Multiconductor cable for control, interlocks, current transformers (CTs), voltage transformers (VTs), meters, and relays routed in cable tray and conduit:
 - 1. Voltage rating: 600V.
 - 2. Sizes:
 - a. Motor control, switchgear and breaker control, interlock control, metering, relaying, and general power control circuits shall be minimum size No. 14 AWG.
 - b. CT and VT circuits shall be minimum No. 10 AWG.
 - 3. Conductors: Annealed, bare copper, Class B, stranded.
 - 4. Insulation: Flame-retardant, cross-linked polyethylene (XLPE) or cross-linked polyolefin (XLPO), complying with physical and electrical requirements for NEC Type XHHW-2.
 - 5. Jacket: Flame-retardant, heat, moisture, and sunlight resistant; cross-linked, low-smoke, non-halogen polyolefin (XLPO).
 - 6. Conductors shall be cabled together with nonhygroscopic fillers.
 - 7. Cover cable assembly with helically applied binding tape with minimum 10 percent overlap.
 - 8. Marking:
 - a. Insulated conductors shall have colored insulation meeting ICEA Method 1, Table 2 color code to identify conductors.
 - b. Each cable shall be identified by means of surface ink printing indicating manufacturer, number of conductors, size, voltage rating, and UL listing as rated for cable tray.
 - 9. Cables shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and individual conductors UL VW-1 vertical flame test.
 - 10. Temperature rating shall be 90 degrees C maximum continuous operating temperature in wet or dry locations.

- I. Instrumentation cable installed indoor or outdoor routed in cable tray, conduit, and ducts:
 - 1. Voltage rating: 600V.
 - 2. Conductors: Annealed, bare copper, Class B, stranded, minimum size No. 16 AWG.
 - 3. Insulation: Flame-retardant, cross-linked polyethylene (XLPE) or cross-linked polyolefin (XLPO).
 - 4. Jacket: Flame-retardant, heat, moisture, and sunlight resistant; cross-linked, low-smoke, non-halogen polyolefin (XLPO).
 - 5. Pairs/triads: Each twisted with lay not exceeding 2 inches.
 - 6. Color code: Pairs black/white, Triads black/white/red.

7. Assembly:
 - a. Each pair or triad shall be cabled together with aluminum/polyester tape shield helically wrapped with minimum lap of 15 percent of tape width and isolation tape. Entire cable assembly shall have overall aluminum/polyester tape shield helically wrapped.
 - b. Flexible strand tin-coated No. 18 AWG copper drain wire shall be helically wound between twisted conductors and tape shield.
 8. Each instrumentation cable shall be identified by means of surface ink printing indicating manufacturer, conductor size, and quantity, UL listing.
 9. Cables shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and individual conductors UL VW-1 vertical flame test.
 10. Temperature rating shall be 90 degrees C maximum continuous operating temperature in wet or dry locations.
- J. Thermocouple extension cable circuited in cable tray or conduit:
1. Voltage rating: 600V.
 2. Conductors: Minimum No. 16 AWG solid alloy (+Chromel / -Constantan) in accordance with ANSI and ASTM/ISA Type EX, KX or JX as indicated on the Drawings.
 3. Insulation: Flame-retardant, cross-linked polyethylene (XLPE) or cross-linked polyolefin (XLPO).
 4. Jacket: Flame-retardant, heat, moisture, and sunlight-resistant; cross-linked, low-smoke, non-halogen polyolefin (XLPO).
 5. Color code: Yellow (+Chromel) and red (-Constantan), meeting requirements of UL, type "PLTC".
 6. Assemble insulated conductors with 1.5 to 2.5-inch twisted lay.
 7. Assembly: Provide with helically applied, laminated aluminum/polyester tape shield, with minimum lap of 15 percent of tape width. Flexible strand tin-coated No. 18 AWG copper drain wire shall be helically wound between twisted conductors and tape shield.
 8. Each thermocouple cable shall be identified by means of surface ink printing indicating manufacturer, conductor size, UL listing as "PLTC," thermocouple type.
 9. Cables shall pass IEEE 1202 70,000 Btu/hr, and ICEA T-29-520, 210,000 Btu/hr vertical tray flame tests, and individual conductors UL VW-1 vertical flame test.
 10. Temperature rating shall be 90 degrees C maximum continuous operating temperature in wet or dry locations.

- K. Provide high-temperature wire around process equipment operating at temperatures exceeding standard cable ratings.
 - 1. Voltage rating: 600V.
 - 2. Temperature rating: Up to 1,000 degrees C.
 - 3. Conductor: Stranded, "A" nickel.
 - 4. Insulation: Layers of ceramic fiber braids.
 - 5. Jacket: Overall metallic sheath.

- L. Category 6 communication cable circuited in tray, conduit or used for field wiring internal to cabinets.
 - 1. Conductor: Solid, bare copper minimum No. 23 AWG.
 - 2. Insulation: Fluorinated ethylene propylene (FEP) insulated singles.
 - 3. Insulated conductors: Unshielded, twisted four pairs enclosed with a spline fluorinated ethylene propylene filler material.
 - 4. Cable assembly shall be covered with clear "Flamearrest" jacket, sequentially marked at 2-foot intervals. Ripcord shall be integrally installed to allow easy removal of jacket material.
 - 5. Each communication cable shall be identified by means of surface ink printing indicating manufacturer, model, or catalog number. Cable shall meet TIA/EIA Draft 9A CAT6.
 - 6. Cables shall be capable of passing UL flame test Type CMP.

- M. Twin-axial communication cable installed indoors in cable tray and conduit:
 - 1. Voltage rating: 600V.
 - 2. Conductor: One pair, bare copper, No. 18 AWG with 7 by 26 stranding.
 - 3. Insulation: Flame-retardant polyolefin.
 - 4. Assembly: Aluminum foil-polyester tape shield with No. 20 AWG, 7 by 28 stranded tinned copper drain wire with 100 percent shield coverage, and tinned copper braid shield with minimum 55 percent coverage. Overall cable assembly shall be Type "PLTC".
 - 5. Jacket: Polyvinyl chloride (PVC).
 - 6. Cable shall be UL-listed 1581 for flame resistance.

- N. Temperature rating shall be 75 degrees C in dry maximum operating temperatures in dry locations.

PART 3 EXECUTION**3.01 PACKAGING AND SHIPPING****A. Reel Construction:**

1. Standard non-returnable wood reels and meet requirements of NEMA WC 26. These reels, while using the most economic construction, must withstand shipping, normal handling in the field, and outdoor storage up to three years in all weather conditions. Supplier shall indicate if cable reel return is required.
2. Reels 36 inches and larger must have steel arbor hole inserts.
3. Plywood flange reels are not acceptable.
4. Each reel of cable protected by a weather-resistant covering of suitable grade to meet the requirements for Class 4, extra-heavy duty physical protector in accordance with NEMA WC 26.

B. Reel Identification:

1. Each reel must have a visible waterproof tag on the outside of each flange.
2. Tags shall be 4 inches by 6 inches and larger for a total of two tags per reel.
3. Tags must include:
 - a. Job name.
 - b. Supplier purchase order number.
 - c. Purchase order line item number.
 - d. Cable description.
 - e. Cable code.
 - f. Cable length.
 - g. Sequential footage markers which match exposed ends.
 - h. Gross weight of the reel.
 - i. Manufacturer name.
 - j. Non-repetitive reel number (matches packing slip).
 - k. Custom reel identifier which will be provided to Supplier at the time of release for shipment.
 - l. Storage requirements shall be shown on reel tags.

C. Delivery:

1. Reels must be transported and delivered standing on flanges.
2. If palletized, reels must be standing on flanges and strapped to pallet.
3. Cable reels must be delivered on flat bed only. Material must be tarped.
4. Each cable reel must have 3 feet exposed test lead on each end.

SWBNO

D. Storage and Handling:

1. Storage: Protect cable from elements during storage.
2. Handling: Do not remove protective lagging from reels until ready to commence pulling operations.

END OF SECTION

SECTION 27 13 23
COMMUNICATIONS OPTICAL FIBER BACKBONE CABLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Type OFNR optical fiber cable.
2. Optical fiber cable hardware.

1.02 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ANSI/Institute of Electrical and Electronics Engineers (IEEE)/NEMA/NECA/UL
2. BICSI TDMM 14th Edition
3. TIA/EIA-455 (2014C) Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers,
4. Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components
5. TIA-455-21 (1988a; R 2012) FOTP-21 Mating Durability of Fiber Optic Interconnecting Devices
6. TIA-455-78-B (2002) FOTP-78 Optical Fibers – Part 1-40: Measurement Methods and Test Procedures – Attenuation
7. TIA-455-107 (1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set
8. TIA/EIA-455-204 (2000) Standard for Measurement of Bandwidth on Multimode Fiber
9. TIA-472D000 (2007b) Fiber Optic Communications Cable for Outside Plant Use
10. TIA-492CAAA (1998; R 2002) Detail Specification for Class IVa Dispersion-Unshifted
11. Single-Mode Optical Fibers
12. TIA-526-7 (2015a) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber
13. Cable Plant
14. TIA-526-14 (2015c) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber
15. Cable Plant
16. ANSI/TIA 569-E Commercial Building Standard for Telecommunications Pathways and Spaces

17. ANSI/TIA-604-10B Fiber Optic Connector Intermateability Standard (FOCIS), Type LC
18. ANSI/TIA-606-C Administration Standard for Telecommunications Infrastructure
19. ANSI/TIA-758-C Customer-Owned Outside Plant Telecommunications Infrastructure Standard
20. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises
21. ANSI/TIA 568.1-E Commercial Building Telecommunications Infrastructure Standard
22. ANSI/TIA 568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standard
23. ANSI/TIA 568.3-D Optical Fiber Cabling Components Standard
24. ANSI/TIA 942-B Telecommunications Infrastructure Standard for Data Centers
25. ANSI/TIA 606-C Administration Standard for Telecommunications Infrastructure
26. ANSI/TIA 607-D.1 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

1.03 DEFINITIONS

- A. **Conductive Cable:** Cable containing non-current carrying electrically conductive members such as metallic strength members and metallic vapor barriers.
- B. **Cross-Connect:** A facility enabling termination of cable elements and their interconnection or cross-connection.
- C. **Type OFNR:** Nonconductive cable for use as riser in vertical shafts or from floor to floor.

1.04 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

1.05 ACTION SUBMITTALS

- A. **Product Data:**
 1. Type OFNR optical fiber cable.
 2. Optical fiber cable hardware.
- B. **Shop Drawings:**

1. System Labeling Schedules:
 - a. Electronic copy of labeling schedules, in software and format selected by Owner.
 - b. Electronic copy of labeling schedules that are part of cabling and asset identification system of software.
2. Cabling administration drawings and printouts.
3. Wiring diagrams showing typical schematic arrangement, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Cross-connects.
 - f. Patch panels.
 - g. Patch cords.
4. Cross-Connect and Patch-Panel Drawings: Detail mounting assemblies and show elevations and physical relationship between installed components.

C. Certificates: For each type of product.

D. Field Quality-Control Reports: Optical fiber cable testing plan.

1.06 INFORMATIONAL SUBMITTALS

A. Source quality-control reports.

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Contracts: Software service agreement.

B. Maintenance Data: For optical fiber cable, splices, and connectors.

1.08 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish to Owner extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet-work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

- B. Test cables upon receipt at Project site.
 - 1. Test optical fiber cable to determine continuity of strand end to end. Use optical fiber flashlight and optical loss test.
 - 2. Test optical fiber cable while on reels. Use optical time domain reflectometer to verify cable length and locate cable defects, splices, and connector, including loss value of each. Retain test data and include record in maintenance data.

PART 2 PRODUCTS

2.01 TYPE OFNR OPTICAL FIBER CABLE

- A. Type OFNR Optical Fiber Cable: This category covers jacketed optical fiber cable for use as risers in vertical runs in shaft or between floors within buildings in accordance with Article 770 of NFPA 70 containing no electrically conductive materials.
- B. Performance Criteria:
 - 1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.
 - 2. Listing Criteria: UL CCN QAYK; including UL 1651.
 - 3. General Characteristics:
 - a. Performance: TIA-568.3-D.
 - b. Inside Plant Mechanical Properties: ICEA S-83-596.
 - c. Inside-Outside Plant Mechanical Properties: ICEA S-104-696.
 - d. Jacket:
 - 1) Cable cordage jacket, fiber, unit, and group color in accordance with TIA-598.
 - 2) Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.
- C. Type OFNR, Designation OS2, Inside-Outside Plant, Single-Mode Optical Fiber Cable:
 - 1. Source Limitations: Obtain products from single manufacturer:
 - a. AFL 48 Strand AFL DNA 28262 ADSS.
 - b. Corning 48 Strand 048E8F-61131-29.
 - c. Corning 24 Strand 024E8F-31131-29.
 - d. Corning 12 Strand 012E8F-31131-29.
 - e. Corning 6 Strand 006E8F-31131-29.
 - 2. Additional Characteristics:

- a. Construction: TIA-492CAAB; 9 μm core diameter, 125 μm cladding diameter, with low water peak.
 - b. Minimum Overfilled Modal Bandwidth-Length Product: 500 MHz-km at 1310 nm wavelength; 500 MHz-km at 1550 nm wavelength.
- D. Type OFNR, Designation OS2, Inside-Outside Plant, Single-Mode Optical Fiber Cable:
- 1. Source Limitations: Obtain products from single manufacturer:
 - a. Corning 48 Strand 048EUF-T4101D20.
 - b. Corning 24 Strand 024ESF-T4101D20.
 - c. Corning 12 Strand 012ESF-T4101D20.
 - d. Corning 6 Strand 006ESF-T4101D20.
 - 2. Additional Characteristics:
 - a. Construction: TIA-492CAAB; 9 μm core diameter, 125 μm cladding diameter, with low water peak.
 - b. Minimum Overfilled Modal Bandwidth-Length Product: 500 MHz-km at 1310 nm wavelength; 500 MHz-km at 1550 nm wavelength.
 - 3. Options:
 - a. Configuration: As depicted on the Drawings: Jetted, single mode, tight buffer , optical fiber cable.
 - b. Maximum Attenuation: 0.5 dB/km at 1310 nm wavelength; 0.5 dB/km at 1550 nm wavelength.
 - c. Jacket Color: Yellow.

2.02 OPTICAL FIBER CABLE HARDWARE

- A. Performance Criteria:
- 1. Fiber Optic Connector Intermateability Standard (FOCIS) specifications of TIA-604 series.
 - 2. TIA-568.3-D.
- B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
- 1. Patch Panels:
 - a. Corning 4RU Enclosure-CCH-04U.
 - b. Corning 24 Strand Cassettes-CCH-CS24A9-P00RE.
 - c. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

- C. Patch Cords: Factory-made, dual-fiber cables based on distance from electronic hardware.
- D. Connector Type: Type LC complying with TIA-604-10,
- E. Plugs and Plug Assemblies:
 - 1. Male: color-coded modular telecommunications connector designed for termination of single optical fiber cable.
 - 2. Insertion loss not more than 0.25dB.
 - 3. Marked to indicate transmission performance.
- F. Jacks and Jack Assemblies:
 - 1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of single optical fiber cable.
 - 2. Insertion loss not more than 0.25dB.
 - 3. Marked to indicate transmission performance.
 - 4. Designed to snap-in to patch panel or faceplate.

2.03 SOURCE QUALITY CONTROL

- A. Owner will witness required factory tests. Notify Architect at least 14 days before date of tests and indicate their approximate duration.
- B. Testing Administrant: Engage qualified testing agency to evaluate cables.
- C. Factory Tests and Inspections: Test and inspect singlemode optical fiber cables, by, or under supervision of, qualified electrical testing laboratory recognized by authorities having jurisdiction, in accordance with TIA-526-7-A and TIA-568.3-D before delivering to site. Affix label with name and date of manufacturer's certification of system compliance.
- D. Nonconforming Work: Cables that do not pass tests and inspections will be considered defective. A partial pass is considered a failed test.
- E. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate backbone cabling with protectors and demarcation point provided by communications service provider.

3.02 SELECTION OF OPTICAL FIBER TYPE

- A. Installed in Vertical Shaft or Floor-to-Floor Riser:
 - 1. Nonconductive:
 - a. Type OFNR or in listed plenum communications raceway.
 - b. Type OFNR in metallic conduit.
 - 2. Conductive:
 - a. Type OFCR or Type OFCP in listed plenum communications raceway.
 - b. Type OFCP in metallic conduit.
- B. Installed in Plenum, Duct, or Other Space Handling Environmental Air:
 - 1. Nonconductive:
 - a. Type OFNP in listed plenum communications raceway.
 - b. Type OFNR or Type OFNP in metallic conduit.
 - 2. Conductive:
 - a. Type OFCP in listed plenum communications raceway.
 - b. Type OFCP in metallic conduit.
- C. Installed in Location Other Than Riser or Plenum:
 - 1. Nonconductive: Type OFNR in metallic conduit.
 - 2. Conductive: Type OFCR in metallic conduit.

3.03 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Optical fiber backbone cabling system must provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- B. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters may not be used as part of backbone cabling.
- C. Comply with BICSI N1, NECA NEIS 1, and NECA NEIS 301.
- D. Backbone cabling system must comply with transmission standards in TIA-568.1.
- E. Telecommunications Pathways and Spaces: Comply with TIA-569.

F. Wiring Methods:

1. Not in Raceway: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
2. In Raceway: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental airspaces, including plenum ceilings.
 - b. Comply with requirements for pathways specified in Section 27 05 28, Pathways for Communications Systems.
3. In Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

G. Optical Fiber Cabling Installation:

1. Comply with TIA-568.1 and TIA-568.3.
2. Comply with BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
3. Terminate all cables; no cable may contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inch and not more than 6 inch from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps may not be used for heating.
9. In communications equipment room, provide 10-foot long service loop on each end of cable.
10. Pulling Cable: Comply with BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.

H. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Cable may not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

I. Installation of Cable Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after flooring system has been installed in raised floor areas.
3. Coil cable 6 feet long not less than 12 inch in diameter below each feed point.

J. Group connecting hardware for cables into separate logical fields.

3.04 FIRESTOPPING

- A. Comply with TIA-569, Annex A, "Firestopping."
- B. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.05 GROUNDING

- A. Install grounding in accordance with BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607 and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind grounding bus bar. Connect grounding bus bar with minimum 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to grounding bus bar, using not smaller than 6 AWG equipment grounding conductor.

3.06 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606. Comply with requirements for identification specified in Section 01 58 53

Project Equipment Identification and 26 05 53 Identification for Electrical Systems.

1. Administration Class: Class 3 or based on current labeling scheme of Client.
- B. Paint and label colors for equipment identification must comply with TIA-606 for Class 3 level of administration including optional identification requirements of this standard and the Client.
- C. Comply with requirements in Section 27 15 23, Communications Optical Fiber Horizontal Cabling for cable and asset management software.
- D. Cable Schedule: Install in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish electronic copy of final comprehensive schedules for Project.
- E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- F. Cable and Wire Identification:
 1. Label each cable within 4 inch of each termination and tap, where it is accessible in cabinet or junction or outlet box, and elsewhere as indicated.
 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 4. Label each unit and field within distribution racks and frames.
 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use different color for jacks and plugs of each service.
- G. Labels must be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-C, for the following:

1. Flexible vinyl or polyester that flexes as cables are bent.

3.07 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Certification equipment must be calibrated within 12 months of the completed certification.
2. Provide an end-to-end loss budget for each cable to be performance tested and certified.
3. Provide optical fiber cleaning procedure used before inserting test cables into optical fiber connectors and bulkheads. All connectors, bulkheads and patch cables must be cleaned before each insertion. Assume all connectors, bulkheads patch cables are contaminated and must be cleaned before each insertion.
4. Backbone cabling must remain undisturbed from the beginning, during and after performance testing and certification. Any cabling connectors or bulkheads relocated or re-inserted after testing and certification must be re-tested and re-certified.

B. Field tests and inspections must be performed by a BICSI certified Installer 2 and witnessed by an RCDD.

C. Tests and Inspections:

1. Visually inspect optical fiber jacket materials for qualified electrical testing laboratory certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA-568.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment, patch cords, and labeling of all components.
3. Optical Fiber Cable Tests:
 - a. Test instruments must meet or exceed applicable requirements in TIA-568.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Tier 2 bi-directional testing is required for all interbuilding backbone cabling. Tier 2 testing includes PDF results from an Optical Loss Test Set (OLTS) and an Optical Time Domain Reflectometer (OTDR).
 - 2) Reference ANSI/TIA-526-7-A – Test procedure for installed single mode fiber cable plant – Released in July 2015 – Reaffirmed: May 11, 2022. Adoption of IEC 61280-4-2 Ed 2.0.

- 3) Attenuation test results must be less than those calculated in accordance with equation in TIA-568.1.

D. Nonconforming Work:

1. Cables will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective cables and retest.

E. Collect, assemble, and submit test and inspection reports.

1. Data for each measurement must be documented. Provide Tier 2 PDF test results within two weeks of completion of performance test and certification.
2. Data for field quality-control report submittals must be printed in summary report that is formatted like Table 10.1 in BICSI TDMM, or transferred from instrument to computer, saved as text files, and printed and submitted.

F. Manufacturer Services: Engage factory-authorized service representative to support field tests and inspections.

3.08 MAINTENANCE

A. Software Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software service agreement includes software support for 2 years.
2. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.
 - a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION

SECTION 27 15 13
COMMUNICATIONS COPPER HORIZONTAL CABLING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Category 6a twisted pair cable.
 2. Twisted pair cable hardware.
 3. Cable management system.
 4. Identification products.
- B. Related Requirements: Section 26 05 19, Low Voltage Wire and Cable for cables not addressed within Division 27.

1.02 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ANSI/Institute of Electrical and Electronics Engineers (IEEE)/NEMA/NECA/UL
 2. BICSI TDMM 14th Edition
 3. TIA/EIA-455 (2014C) Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers,
 4. Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components
 5. TIA-455-21 (1988a; R 2012) FOTP-21 Mating Durability of Fiber Optic Interconnecting Devices
 6. TIA-455-78-B (2002) FOTP-78 Optical Fibers – Part 1-40: Measurement Methods and Test Procedures – Attenuation
 7. TIA-455-107 (1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set
 8. TIA/EIA-455-204 (2000) Standard for Measurement of Bandwidth on Multimode Fiber
 9. TIA-472D000 (2007b) Fiber Optic Communications Cable for Outside Plant Use
 10. TIA-492CAAA (1998; R 2002) Detail Specification for Class IVa Dispersion-Unshifted
 11. Single-Mode Optical Fibers
 12. TIA-526-7 (2015a) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber
 13. Cable Plant

14. TIA-526-14 (2015c) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber
15. Cable Plant
16. ANSI/TIA 569-E Commercial Building Standard for Telecommunications Pathways and Spaces
17. ANSI/TIA-604-10B Fiber Optic Connector Intermateability Standard (FOCIS), Type LC
18. ANSI/TIA-606-C Administration Standard for Telecommunications Infrastructure
19. ANSI/TIA-758-C Customer-Owned Outside Plant Telecommunications Infrastructure Standard
20. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises
21. ANSI/TIA 568.1-E Commercial Building Telecommunications Infrastructure Standard
22. ANSI/TIA 568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standard
23. ANSI/TIA 568.3-D Optical Fiber Cabling Components Standard
24. ANSI/TIA 942-B Telecommunications Infrastructure Standard for Data Centers
25. ANSI/TIA 606-C Administration Standard for Telecommunications Infrastructure
26. ANSI/TIA 607-D.1 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

1.03 DEFINITIONS

- A. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- B. EMI: Electromagnetic interference.
- C. FTP: Shielded twisted pair.
- D. F/FTP: Overall foil screened cable with foil screened twisted pair.
- E. F/UTP: Overall foil screened cable with unscreened twisted pair.
- F. IDC: Insulation displacement connector.
- G. Jack: Also commonly called an "outlet," it is the fixed, female connector.
- H. LAN: Local area network.
- I. Plug: Also commonly called a "connector," it is the removable, male telecommunications connector.

- J. RCDD: Registered Communications Distribution Designer.
- K. Screen: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- L. Shield: A metallic layer, either a foil or braid, placed around a pair or group of conductors.
- M. S/FTP: Overall braid screened cable with foil screened twisted pair.
- N. S/UTP: Overall braid screened cable with unscreened twisted pairs.
- O. UTP: Unscreened (unshielded) twisted pair.

1.04 COPPER HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C, and the equipment outlet, otherwise known as "Cabling Subsystem 1," in the telecommunications cabling system structure. Cabling system consists of horizontal cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.
 - 1. TIA-568.1-E requires that a minimum of two equipment outlets be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications equipment outlet.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 square feet. and includes the components that extend from the equipment outlets to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.05 ACTION SUBMITTALS

- A. Product Data:
 - 1. Category 6a twisted pair cable.
 - 2. Category 5e twisted pair cable.
 - 3. Twisted pair cable hardware.
 - 4. Cable management system.
 - 5. Identification products.

- B. Shop Drawings: Reviewed and stamped by RCDD.
 - 1. System Labeling Schedules:
 - a. Electronic copy of labeling schedules, in software and format selected by Owner.
 - b. Electronic copy of labeling schedules that are part of cabling and asset identification system of software.
 - 2. Cabling administration Drawings and printouts.
 - 3. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Telecommunications conductor drop locations.
 - f. Typical telecommunications details.
 - g. Mechanical, electrical, and plumbing systems.
- C. Twisted pair cable testing plan.
- D. Samples: For telecommunications jacks and plugs, in specified finish, one for each type and configuration and cover plates for color selection and evaluation of technical features.
- E. Field Quality-Control Submittals: Field quality-control reports.

1.06 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.
- B. Product Certificates: For each type of product.
- C. Source quality-control reports.

1.07 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For splices and connectors to include in maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On USB media or compact disk, complete with data files.

3. Device address list.
4. Printout of software application and graphic screens.

1.08 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.09 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 1. Layout Responsibility: Preparation of Shop Drawings, cabling administration Drawings, and field testing program development by an RCDD.
 2. Installation Supervision: Installation shall be under the direct supervision of Technician or Level 2 Installer, who shall be present at all times when Work of this section is performed at Project site.
 3. Testing Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 1. Test each pair of twisted pair cable for open and short circuits.

1.11 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.12 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications and LAN equipment and service suppliers.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.
- B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.
- C. Grounding: Comply with TIA-607-D.

2.02 GENERAL CABLE CHARACTERISTICS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with the applicable standard and NFPA 70 for the following types:
 - 1. Communications, Plenum Rated:
 - a. Type CMP complying with UL 1685 or Type CMP in listed plenum communications raceway or Type CMP in listed cable routing assembly.
 - b. Type CMP in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
 - 2. Communications, Non-Plenum Rated:
 - a. Type CMR complying with UL 1666 and ICEA S-103-701.
 - b. Type Type CMR in listed plenum or riser communications raceway.
 - c. Type CMR in metallic conduit installed according to NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- C. RoHS compliant.

2.03 CATEGORY 6A TWISTED PAIR CABLE

- A. Category 6a Twisted Pair Cable: Four-pair, balanced twisted pair cable, certified to meet transmission characteristics of Category 6a cable at frequencies up to 500 MHz.
 - 1. Siemon CAT 6A Cable F/UTP- 9A6P4-A5-07-R1A.
- B. Standard: Comply with TIA-568.2-D for Category 6a cables.
- C. Conductors: 100-ohm, 23 AWG solid copper.
- D. Shielding/Screening: Unshielded twisted pairs (UTP) and/or Shielded twisted pairs (FTP).
- E. Cable Rating: Riser.
- F. Jacket: Blue thermoplastic.

2.04 CATEGORY 5E TWISTED PAIR CABLE

- A. Category 5e Twisted Pair Cable: Four-pair, balanced twisted pair cable, certified to meet transmission characteristics of Category 5e cable at frequencies up to 100 MHz.
 - 1. Siemon CAT 5e Cable 9C5P4-E1-06-RXA.
- B. Standard: Comply with TIA-568.2-D for Category 5e cables.
- C. Conductors: 100-ohm, 23 AWG solid copper.
- D. Shielding/Screening: Unshielded twisted pairs (UTP) and/or Shielded twisted pairs (FTP).
- E. Cable Rating: Riser.
- F. Jacket: Blue thermoplastic.

2.05 TWISTED PAIR CABLE HARDWARE

- A. Twisted Pair Cable Hardware: Hardware designed to connect, splice, and terminate twisted pair copper communications cable.
- B. General Requirements for Twisted Pair Cable Hardware:
 - 1. Comply with the performance requirements of Category 6a and 5e.

2. Comply with TIA-568.2-D, IDC type, with modules designed for punch-down caps or tools.
 3. Cables shall be terminated with connecting hardware of same category or higher.
- C. Source Limitations: Obtain twisted pair cable hardware from same manufacturer or manufacturer partner as twisted pair cable, from single source.
- D. Connecting Blocks:
1. 110-style IDC for Category 6a and 5e.
 2. Provide blocks for the number of cables terminated on the block, plus 25 percent spare, integral with connector bodies, including plugs and jacks where indicated.
- E. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
1. Number of Terminals per Field: One for each conductor in assigned cables.
- F. Patch Panel: Modular panels housing numbered jack units with IDC-type connectors at each jack location for permanent termination of pair groups of installed cables.
1. Siemon DIN-PNL-RIC-01:
 - a. Universal T568A and T568B wiring labels.
 - b. Labeling areas adjacent to conductors.
 - c. Replaceable connectors.
 - d. 24 ports.
 2. Construction: 16-gauge steel and mountable on 19-inch equipment racks.
 3. Number of Jacks per Field: One for each four-pair cable indicated, conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria.
- G. Patch Cords: Factory-made, four-pair cables in 36-inch, 48-inch, and 72-inch lengths as necessary based on termination field and switch location. Additional lengths may be required; terminated with an eight-position modular plug at each end.
1. Siemon MC5-07-0202.
 2. Siemon SP6A-S03-07.

3. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure performance. Patch cords shall have latch guards to protect against snagging.
4. Patch cords shall have color-coded boots for circuit identification.

H. Plugs and Plug Assemblies:

1. Male; eight position; color-coded modular telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
2. Standard: Comply with TIA-568.2-D.
3. Marked to indicate transmission performance.

I. Jacks and Jack Assemblies:

1. Siemon Z-MaxShield 6A Jacks.
2. Siemon MX5-K06 5e Jacks.
3. Female; eight position; modular; fixed telecommunications connector designed for termination of a single four-pair, 100-ohm, unshielded or shielded twisted pair cable.
4. Designed to snap-in to a patch panel or cover plate.
5. Standard: Comply with TIA-568.2-D.
6. Marked to indicate transmission performance.

J. Cover Plate:

1. Siemon 2 Port Faceplate-10GMX-FPS02-02.
2. Siemon 4 Port Faceplate-10GMX-FPS04-02.
3. Cover Plates: Reference Section 26 05 75 Basic Electrical Materials and Methods
4. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.

K. Legend:

1. Machine printed, in the field, using adhesive-tape label.
2. Snap-in, clear-label covers and machine-printed paper inserts.

2.06 CABLE MANAGEMENT SYSTEM

- A. Cable Management System: Computer-based cable management system, with integrated database capabilities.
- B. Document physical characteristics by recording the network, TIA details, and connections between equipment and cable.

- C. Information shall be presented in database view, schematic plans, or technical Drawings.
 - 1. AutoCAD or Revit drawing software shall be used as Drawing and schematic plans software.
- D. System shall interface with the following testing and recording devices:
 - 1. Direct upload tests from circuit testing instrument into the personal computer.
 - 2. Direct download circuit labeling into labeling printer.

2.07 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-C and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.08 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test cables on reels according to TIA-568.1-E.
- C. Factory test twisted pair cables according to TIA-568.2-D.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 WIRING METHODS

- A. Routing:
 - 1. Install cables in raceways and cable trays, except within consoles, cabinets, desks, and counters. Conceal raceway and cables, except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways specified in Section 26 05 33, Conduit Installation and 26 05 36, Cable Tray.
 - a. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- B. Wiring within Enclosures: Bundle, lace, and train cables within enclosures using hook and loop fasteners. No plastic zip ties are allowed for bundling or

dressing network cables. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools. Install conductors parallel with or at right angles to sides and back of enclosure.

3.02 INSTALLATION OF PATHWAYS

- A. Comply with requirements for demarcation point, cabinets, and racks specified in Section 40 95 33 Process Control Networks
- B. Comply with Section 26 05 33, Conduit Installation and 26 05 36, Cable Tray, and 26 05 29 Hangers and Supports for Electrical Systems.
- C. Drawings indicate general arrangement of pathways and fittings.

3.03 INSTALLATION OF TWISTED PAIR HORIZONTAL CABLES

- A. Comply with NECA 1 and NECA/BICSI 568.
- B. General Requirements for Cabling:
 - 1. Comply with TIA-568.0-E, TIA-568.1-E, and TIA-568.2-D.
 - 2. Comply with the most current version of BICSI's "Information Transport Systems Installation Methods Manual (ITSIMM), Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" section.
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.
 - 4. Do not untwist twisted pair cables more than 1/2 inch from the point of termination to maintain cable geometry.
 - 5. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 6. MUTOA shall not be used as a cross-connect point.
 - 7. Consolidation points may be used only for making a direct connection to equipment outlets:
 - a. Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - b. Locate consolidation points for twisted pair cables at least 49 feet from communications equipment room.
 - 8. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 9. Install lacing bars to restrain cables, prevent straining connections, and prevent bending cables to smaller radii than minimums recommended by manufacturer.

10. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Cable Termination Practices" section. Use lacing bars and distribution spools.
11. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
12. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
13. In the communications equipment room, install a 10-foot-long service loop on each end of cable.
14. Pulling Cable: Comply with the most current version of BICSI Information Transport Systems Installation Methods Manual, Ch. 5, "Copper Structured Cabling Systems," "Pulling and Installing Cable" section. Monitor cable pull tensions.

C. Open-Cable Installation:

1. Open-cable installation is only to be used in locations where cable tray or conduit is not feasible. The maximum distance for the cable tray using open-cable supports is 50 feet.
2. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
3. Suspend twisted pair cabling, not in a wireway or pathway, a minimum of 8 inches above ceilings by cable supports not more than 60 inches apart.
4. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

D. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable in a figure 8 configuration 6 feet long not less than 12 inches in diameter below each feed point.

E. Group connecting hardware for cables into separate logical fields.

F. Separation from EMI Sources:

1. Comply with recommendations from BICSI's "Telecommunications Distribution Methods Manual" and TIA-569-D for separating

- unshielded copper communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less than 2 kVA: A minimum of 5 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches.
 - c. Electrical Equipment Rating More than 5 kVA: A minimum of 24 inches.
 3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less than 2 kVA: A minimum of 2-1/2 inches.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches.
 - c. Electrical Equipment Rating More than 5 kVA: A minimum of 12 inches.
 4. Separation between communications cables in grounded metallic raceways, power lines, and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - a. Electrical Equipment Rating Less than 2 kVA: No requirement.
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
 - c. Electrical Equipment Rating More than 5 kVA: A minimum of 6 inches.
 5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
 6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

3.04 FIRESTOPPING

- A. Comply with TIA-569-D, Annex A, "Firestopping."
- B. Comply with "Firestopping Systems" Article in BISCI's "Telecommunications Distribution Methods Manual."

3.05 GROUNDING

- A. Comply with requirements in Section 27 05 26, Grounding and Bonding for Communications Systems for grounding conductors and connectors.

- B. Install grounding according to the "Grounding, Bonding, and Electrical Protection" chapter in BICSI's "Telecommunications Distribution Methods Manual."
- C. Comply with TIA-607-D and NECA/BICSI-607.
- D. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall, allowing at least a 2-inch clearance behind the grounding bus bar. Connect grounding bus bar to suitable electrical building ground, using a minimum No. 4 AWG grounding electrode conductor.
- E. Bond metallic equipment to the grounding bus bar, using not smaller than a No. 6 AWG equipment grounding conductor.

3.06 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-C. Comply with requirements for identification specified in Section 01 58 53 Project Equipment Identification and 26 05 53 Identification for Electrical Systems.
 - 1. Administration Class: Class 3.
 - 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- B. Paint and label colors for equipment identification shall comply with TIA-606-C for Class 3 level of administration, including optional identification requirements of this standard.
- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- E. Cable and Wire Identification:
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at the device if wire color is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 4. Label each terminal strip, and screw terminal in each cabinet, rack, or panel.
 - a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group, extended from a panel or cabinet to a building-mounted device, with the name and number of a particular device.
 - b. Label each unit and field within distribution racks and frames.
 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and -connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type, with a printing area and font color that contrast with cable jacket color but still comply with TIA-606-C requirements for the following:
1. Cables use flexible vinyl or polyester that flexes as cables are bent.

3.07 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation: Horizontal cabling must remain undisturbed before, during and after testing and certification. Certification equipment must be calibrated within 12 months of the complete certification.
- B. Field tests and inspections must be witnessed by authorities having jurisdiction or be performed by a third party RCDD or Technician.
- C. Tests and Inspections:
 1. Visually inspect jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA-568.1-E.
 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 3. Test twisted pair cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.

- a. Test instruments shall meet or exceed applicable requirements in TIA-568.2-D. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- D. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similarly to Table 10.1 in BICSI's "Telecommunications Distribution Methods Manual," or shall be transferred from the instrument to the computer, saved as text files, printed, and submitted.
- E. Nonconforming Work:
 1. End-to-end cabling will be considered defective if it does not pass tests and inspections.
 2. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- F. Collect, assemble, and submit test and inspection reports.
- G. Manufacturer Services: Engage factory-authorized service representative to support field tests and inspections.

3.08 MAINTENANCE

- A. Software Service Agreement:
 1. Technical Support: Beginning at Substantial Completion, verify that software service agreement includes software support for 2 years.
 2. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Verify that upgrading software includes operating system and new or revised licenses for using software.
 - a. Upgrade Notice: No fewer than 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.
 3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION

SECTION 27 15 23
COMMUNICATIONS OPTICAL FIBER HORIZONTAL CABLING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:
1. 850 nanometer laser-optimized 50/125 micrometer multimode optical fiber cable (OM4).
 2. Optical fiber cable connecting hardware, patch panels, and cross-connects.
 3. Grounding.
 4. Cabling identification products.

1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
1. ANSI/Institute of Electrical and Electronics Engineers (IEEE)/NEMA/NECA/UL
 2. BICSI TDMM 14th Edition
 3. TIA/EIA-455 (2014C) Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers,
 4. Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components
 5. TIA-455-21 (1988a; R 2012) FOTP-21 Mating Durability of Fiber Optic Interconnecting Devices
 6. TIA-455-78-B (2002) FOTP-78 Optical Fibers – Part 1-40: Measurement Methods and Test Procedures – Attenuation
 7. TIA-455-107 (1999a) FOTP-107 Determination of Component Reflectance or Link/System Return Loss using a Loss Test Set
 8. TIA/EIA-455-204 (2000) Standard for Measurement of Bandwidth on Multimode Fiber
 9. TIA-472D000 (2007b) Fiber Optic Communications Cable for Outside Plant Use
 10. TIA-492CAAA (1998; R 2002) Detail Specification for Class IVa Dispersion-Unshifted

11. Single-Mode Optical Fibers
12. TIA-526-7 (2015a) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber
13. Cable Plant
14. TIA-526-14 (2015c) OFSTP-14A Optical Power Loss Measurements of Installed Multimode Fiber
15. Cable Plant
16. ANSI/TIA 569-E Commercial Building Standard for Telecommunications Pathways and Spaces
17. ANSI/TIA-604-10B Fiber Optic Connector Intermateability Standard (FOCIS), Type LC
18. ANSI/TIA-606-C Administration Standard for Telecommunications Infrastructure
19. ANSI/TIA-758-C Customer-Owned Outside Plant Telecommunications Infrastructure Standard
20. ANSI/TIA-568.0-E Generic Telecommunications Cabling for Customer Premises
21. ANSI/TIA 568.1-E Commercial Building Telecommunications Infrastructure Standard
22. ANSI/TIA 568.2-D Balanced Twisted-Pair Telecommunications Cabling and Components Standard
23. ANSI/TIA 568.3-D Optical Fiber Cabling Components Standard
24. ANSI/TIA 942-B Telecommunications Infrastructure Standard for Data Centers
25. ANSI/TIA 606-C Administration Standard for Telecommunications Infrastructure
26. ANSI/TIA 607-D.1 Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises

1.04 DEFINITIONS

- A. BICSI: Building Industry Consulting Service International.
- B. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- C. RCDD: Registered Communications Distribution Designer.

1.05 OPTICAL FIBER HORIZONTAL CABLING DESCRIPTION

- A. Optical fiber horizontal cabling system shall provide interconnections between Distributor A, Distributor B, or Distributor C and the equipment outlet, otherwise known as "Cabling Subsystem 1" in the telecommunications cabling system structure. Cabling system consists of horizontal cables,

intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for horizontal-to-horizontal cross-connection.

1. TIA-568.1-E requires that a minimum of two equipment outlets be installed for each work area.
 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the equipment outlet.
 3. Bridged taps and splices shall not be installed in the horizontal cabling.
- B. A work area is approximately 100 square feet and includes the components that extend from the equipment outlets to the equipment.
- C. The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of 16 feet to the workstation equipment or in the horizontal cross-connect.

1.06 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Reviewed and stamped by RCDD.
1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 3. Cabling administration Drawings and printouts.
 4. Wiring diagrams and installation details of telecommunications equipment, to show location and layout of telecommunications equipment, including the following:
 - a. Telecommunications rooms plans and elevations.
 - b. Telecommunications pathways.
 - c. Telecommunications system access points.
 - d. Telecommunications grounding system.
 - e. Telecommunications conductor drop locations.
 - f. Typical telecommunications details.
 - g. Mechanical, electrical, and plumbing systems.
- C. Fiber optic cable testing plan.

1.07 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For RCDD, Installer, installation supervisor, and field inspector.

- B. Product Certificates: For each type of product.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.08 CLOSEOUT SUBMITTALS

- A. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On USB media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
- B. Maintenance Data: For optical fiber cable, splices, and connectors to include in maintenance manuals.

1.09 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
 - 1. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field-testing program development by an RCDD or Technician.
 - 2. Installation Supervision: Installation shall be under the direct supervision of Technician or Level 2 Installer, who shall be always present when Work of this section is performed at Project site.
 - 3. Testing Supervisor: Currently certified by BICSI as an RCDD or Technician.
- B. Testing Agency Qualifications: Testing agency must have personnel certified by BICSI on staff.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Test cables upon receipt at Project site.
 - 1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
 - 2. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.

1.12 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.13 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with Owner's telecommunications equipment and service suppliers.

1.14 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for 2 years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA-568.1-E, when tested according to test procedures of this standard.

B. Telecommunications Pathways and Spaces: Comply with TIA-569-E.

C. Grounding: Comply with TIA-607-D.

2.02 850 NANOMETER LASER-OPTIMIZED, 50/125 MICROMETER, MULTIMODE OPTICAL FIBER CABLE (OM4)

A. Description: Multimode, 50/125-micrometer (strand count as described on the Drawings) nonconductive, tight buffer, optical fiber cable.

1. Corning 12 Strand 012T8F-31190-29.
2. Corning 6 Strand 006T8F-31190-29.
3. Corning 2 Strand 002T8F-31190-29.

B. Standards:

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA-568-D.3 for performance specifications.
3. Comply with TIA-492AAAD for detailed specifications.

C. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.

D. Minimum Overfilled Modal Bandwidth-length Product: 3500 MHz-km at 850 nm; 500 MHz-km at 1300 nm.

E. Minimum Effective Modal Bandwidth-length Product: 4700 MHz-km at 850 nm.

F. Jacket:

1. Jacket Color: Aqua.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-D.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

G. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

1. Non Plenum Rated, Nonconductive: Type OFNR, complying with NFPA 262.
2. Non Plenum Rated, Nonconductive: Type OFNR in listed plenum communications raceway.
3. Non Plenum Rated, Conductive: Type OFCR, complying with NFPA 262.

4. Non Plenum Rated, Conductive: Type OFCR or Type OFNR in listed plenum communications raceway.
5. Non Plenum Rated, Conductive: Type OFCR, or Type OFNR in metallic conduit installed per NFPA 70, Article 300.22, "Wiring in Ducts, Plenums, and Other Air-Handling Spaces."

2.03 OPTICAL FIBER CABLE HARDWARE

A. Standards:

1. Comply with Fiber Optic Connector Intermateability Standard (FOCIS) specifications of the TIA-604 series.
2. Comply with TIA-568.3-D.

B. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.

1. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.

C. Patch Cords: Factory-made, single-fiber cables in 36-inch lengths.

D. Connector Type: Type LC complying with TIA-604-10-B, connectors.

E. Plugs and Plug Assemblies:

1. Male; color-coded modular telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.

F. Jacks and Jack Assemblies:

1. Female; quick-connect, simplex and duplex; fixed telecommunications connector designed for termination of a single optical fiber cable.
2. Insertion loss not more than 0.25 dB.
3. Marked to indicate transmission performance.
4. Designed to snap-in to a patch panel or faceplate.

G. Faceplate:

1. Four -port, vertical single-gang faceplates designed to mount to single-gang wall boxes.
2. Twelve -port, vertical double-gang faceplates designed to mount to double-gang wall boxes.

3. Cover Plates: Reference Section 26 05 75 Basic Electrical Materials and Methods
4. For use with snap-in jacks accommodating any combination of twisted pair, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.

2.04 GROUNDING

- A. Comply with requirements in Section 27 05 26, Grounding and Bonding for Communications Systems for grounding conductors and connectors.
- B. Comply with TIA-607-D.

2.05 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606-C and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

2.06 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test multimode optical fiber cables according to TIA-526-14-B and TIA-568-D.3.
- C. Factory test preterminated optical fiber cable assemblies according to TIA-526-14-B and TIA-568-D.3.
- D. Cable will be considered defective if it does not pass tests and inspections.
- E. Prepare test and inspection reports.

PART 3 EXECUTION

3.01 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Comply with requirements for raceways specified in Section 26 05 33, Conduit Installation and 26 05 36, Cable Tray.
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

- C. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.02 INSTALLATION OF OPTICAL FIBER BACKBONE CABLES

- A. Comply with NECA 1, NECA 301 and NECA/BICSI 568.
- B. General Requirements for Optical Fiber Cabling Installation:
 - 1. Comply with TIA-568.1-E and TIA-568.3-D.
 - 2. Comply with the most current version of the BICSI ITSIMM, Ch. 6, "Cable Termination Practices."
 - 3. Terminate all cables; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - 4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - 5. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - 6. Bundle, lace, and train cable to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in the most current version of the BICSI ITSIMM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
 - 7. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - 8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - 9. In the communications equipment room, provide a 10-foot-long service loop on each end of cable.
 - 10. Pulling Cable: Comply with the most current version of the BICSI ITSIMM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
 - 11. Cable may be terminated on connecting hardware that is rack or cabinet mounted.
- C. Open-Cable Installation:
 - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

2. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- D. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
 2. Install cabling after the flooring system has been installed in raised floor areas.
 3. Coil cable 6 feet long not less than 12 inches in diameter below each feed point.
- E. Group connecting hardware for cables into separate logical fields.

3.03 FIRESTOPPING

- A. Comply with TIA-569-E, Annex A, "Firestopping."
- B. Comply with BICSI ITSIMM, "Firestopping" Chapter.

3.04 GROUNDING

- A. Install grounding according to the most current version of the BICSI ITSIMM, "Grounding (Earthing), Bonding, and Electrical Protection" Chapter.
- B. Comply with TIA-607-D and NECA/BICSI-607.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.05 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA-606-C. Comply with requirements for identification specified in Section 01 58 53 Project Equipment Identification and 26 05 53 Identification for Electrical Systems.
 1. Administration Class: Class 3.
 2. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.

- B. Paint and label colors for equipment identification shall comply with TIA-606-C for Class 3 level of administration including optional identification requirements of this standard.
- C. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, horizontal pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- E. Cable and Wire Identification:
 - 1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet.
 - 4. Label each unit and field within distribution racks and frames.
 - 5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
- F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA 606-C, for the following:
 - 1. Flexible vinyl or polyester that flexes as cables are bent.

3.06 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- D. Perform tests and inspections.
- E. Tests and Inspections:
 - 1. Visually inspect optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments and inspect cabling connections for compliance with TIA-568-E.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Optical Fiber Cable Tests:
 - a. Test instruments shall meet or exceed applicable requirements in TIA-568-D.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - b. Link End-to-End Attenuation Tests:
 - 1) Horizontal and Multimode Horizontal Link Measurements: Test at 850 or 1300 nm in one direction according to TIA-526-14-B, Method B, One Reference Jumper.
 - 2) Attenuation test results for horizontal links shall be less than 2.0 dB. Attenuation test results shall be less than those calculated according to equation in TIA-568.1-E.
- F. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted like Table 10.1 in the most current version of the BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- G. Remove and replace cabling where test results indicate that it does not comply with specified requirements.
- H. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- I. Prepare test and inspection reports.

END OF SECTION

**SECTION 28 13 00
SECURITY SYSTEMS**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Access Control System (ACS) and Video Management System (VMS) operating system, application software, hardware, and component requirements.
2. Security system integration and startup.

1.02 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including Contract Documents and Division 01 - General Requirements, apply to this Section.

1. Section 01 33 00, Submittals.
2. Section 01 78 23, Operation and Maintenance Data.
3. Section 26 00 00, Common Work Results for Electrical.
4. Section 26 05 26, Grounding and Bonding.
5. Section 26 05 32, Conduits.
6. Section 26 05 19, Low Voltage Wire Connections.

1.03 DESIGN INTENT

A. ACS: Extension of the Owner's existing system, providing access control and contact monitoring on doors as shown on Drawings.

B. VMS: Extension of the Owner's existing VMS system, with cameras located where shown on Drawings and displaying live video on existing and a new workstation in the PDC - AUX Power building.

1.04 DESIGN REQUIREMENTS

A. Design, install, program, and calibrate a complete and functional security system as specified in this Section and as shown on Drawings:

1. Provide security components at locations indicated on the Drawings.
 - a. Components shown on Drawings are a minimum.
 - b. Provide any additional components required to make a complete and functional system that meets the functional intent of the Drawings and Specifications.
2. Evaluate existing ACS and VMS systems and confirm they are capable of supporting the existing system as well as serve all new devices at

locations shown on Drawings, including all power supplies and network switches.

- B. Include any new software or device licenses required for the new components.
- C. ACS:
 - 1. Designated card access doors shall receive access control card readers for entry, free egress requires no previous knowledge as noted on the Drawings.
 - 2. Other perimeter monitored doors shall receive door status contact switches for monitoring alarm conditions, such as door open and door closed conditions, as noted on Drawings.
 - 3. Locate access control software on a workstation for enrollment and alarm annunciation.
 - 4. Encrypt communications between servers, workstations, system controllers and card readers, using SSL encryption of all traffic.
 - 5. Failure Mode: Facility doors are to fail secure (locked) upon expiration of battery power.
 - 6. Enclosure Location: ACS door access controller enclosure to be located as shown on Drawings.
 - 7. Enclosure Locks: Door access controller enclosures to be locked, using the same type of lock and key as currently used by the Owner Representative for enclosures in other facilities. Coordinate with the Owner Representative for lock information.
 - 8. The Subcontractor shall program and install the ACS to allow system administrators to carry out the following tasks from a single workstation:
 - a. View system status, access control, intrusion, and video alarms.
 - b. Administer the entire system.
 - c. Filter and request reports.
 - d. Display alarms or device status as a continually updated list or as a graphical map with icons updating in real time.
 - e. Program automatic lock and unlock schedules for access-controlled doors.
 - f. Program automatic Arm or disarm intrusion detection devices.
 - g. Put the facility into lockdown mode, automatically locking down all doors with one (1) set of commands.
 - h. Add or delete users.
 - i. Issuance or revocation of credentials.
- D. VMS:
 - 1. Designated camera locations shall receive fixed, pan/tilt-zoom, or multi-imager cameras as indicated on the Drawings.
 - 2. Multitasking capability: Ability to record video, display live video, and display recorded video simultaneously.
 - a. No task such as system administration, search or export of video shall stop the system from recording video.

3. Storage: Store recorded video on a rack mounted network video recorder (NVR), unless otherwise noted, with video storage capacity no less than 30 days.
 4. Preset motion: The VMS shall have the ability to command a pan/tilt-zoom (PTZ) camera to a preset position, based upon any ACS alarm inputs.
 5. Manual control: The VMS shall have the ability to manually control a PTZ camera.
 6. New presets: The VMS shall have the ability to program new PTZ preset positions remotely.
 7. Mounting brackets: Furnish and install cameras with mounting brackets as shown on the Drawings and as required.
 8. Tamper-proof fasteners: Install all devices with tamper-proof fasteners.
 9. The Subcontractor shall program and install the VMS to provide the following functional abilities:
 - a. Record and recall emergencies and incidents.
 - b. Track persons of interest and recall.
 - c. Monitor and track facility activities.
 - d. Utilize video as evidence during an investigation.
 - e. Integrate with access control management system.
- E. Integration between ACS and VMS: The Owner's ACS and VMS systems are integrated, and new security components shall provide the following:
1. Upon a card read attempt the ACS will be capable of displaying the camera view of the door being accessed.
 2. Upon receiving an alarm condition, the ACS will be capable of automatically displaying a camera scene to a viewing VMS monitor.
 3. Upon receiving an alarm condition, the ACS will be capable of triggering a PTZ camera to move to a preset position.
 4. VMS alarms are to be displayed within the ACS software. Displayed video alarms shall include, as a minimum:
 - a. Video surveillance network communication failure.
 - b. Loss of video channel.
 - c. Loss of power.
 - d. Analytic alarm (motion alarm).
- F. Conduit and raceways:
1. Security wiring is to be protected within conduit or raceways; provide and install conduit pathways as required to implement the ACS, and VMS.
 2. Security wiring may not be intermingled with other system wiring but must be within a dedicated raceway system.
 3. Where possible, route conduits within the interior of the building, concealed from view and tampering.
 4. Conduit paths, where shown, are for coordination purposes only.
 - a. Ensure a complete raceway system exists for all security wiring.

5. Owner's representative shall provide conduits as specified in Section 16130 - Conduits.
- G. Wiring:
1. Select the appropriate wire and cable types and install to each device to provide a fully functional system.
 2. Monitor interconnecting and network wiring between security components for integrity so that an abnormal condition (wire-to-wire short, wire break, or wire ground-fault condition) is automatically indicated to the user upon arming the system.
- H. Power:
1. Coordinate any required 120V circuits for power supplies for the security system.
 2. Owner is providing UPS for the entire IT space. Security to provide 4 hours for battery power as indicated on the Drawings.
- I. Cyber Security:
1. Provide cyber security protection of new security components by making the following minimum configuration settings as described below:
 - a. Ensure all system firmware on ACS panels, cameras and other internet protocol devices are of the latest version compatible with the settings and configurations to be used in the system.
 - b. Keep devices updated in a controlled and supervised manner after verification that firmware works as expected for the intended environment.
 - c. Require all default passwords be changed to a more secure password of at least 8 characters or more, using a combination of upper-and-lowercase letters and numbers as a minimum.
 - 1) Coordinate with the Owner IT Representative for password complexity requirements.
 - 2) Turn over list of passwords to the Owner IT Representative.
 - d. Other additional cyber protection enhancements may be considered and implemented if proposed during the submittal process.

1.05 SUBMITTALS

- A. Submit as specified in Section 013300- Shop Drawings, Product Data and Samples.
- a. Identify which security devices and location will require an IP address and switch port from the IT department and an estimated time installation will occur.
- B. Product data:
1. Calculations:

- a. Battery and UPS Calculations:
 - 1) Contractor to provide an itemized load calculation for each battery and UPS indicating all components backed up, and their estimated backup duration.
 - 2) Calculations shall be in MS Excel format.
2. Video storage calculations:
 - a. Contractor to provide an itemized video storage calculation for each video storage unit indicating duration of video storage provided.
 - b. Calculations shall be in MS Excel format.
- C. Software Configuration:
 1. Alarm Integration: Provide an example of the proposed integration of alarms between ACS, VMS, and video analytics and integrate it with the Owner's security system.
 2. Owner's Information Technology (IT) Coordination Plan: Coordinate a plan.
 - a. Identify which security devices and location will require an IP address and switch port from the IT department and an estimated time installation will occur.
 3. Network Cyber Security Plan: Provide a security network cyber security plan, identifying the network protection steps proposed to be undertaken during the installation and calibration to ensure cyber security.
- D. Shop Drawings:
 1. At a minimum, Shop Drawings shall include the following:
 - a. Supplier's Data: Specifications and installation instructions for each piece of equipment. Submit originals or laser printed white paper, no photo or facsimile copies.
 - b. Catalog information for devices and equipment. Submit originals or laser-printed white paper, no photo or facsimile copies.
 - c. Detailed point-to-point wiring diagrams showing power, signal, and control wiring including routing and termination points on each device. Complete wiring diagrams (data and low voltage power) for systems and subsystems devices.
 - d. Panel board diagrams (elevation view) showing configurations of control equipment, power supplies, input/output devices, communications devices, and other system control devices.
 - e. Functional block diagrams showing integrated relationship of equipment, cabling, and termination points on 1 drawing.
 - f. Diagrams for cable management system.
 - g. UPS, battery, and charger calculations for security panels.
 - h. Power supply calculations showing that they are capable of handling power consumption including 25 percent future capacity.

- i. Video storage calculations for each video storage unit indicating duration of video storage provided. Calculations shall be in MS Excel format.
 - j. Programming Matrix: Showing how all components will operate.
 - 2. Anchorage and bracing calculations:
 - 3. Example graphical human machine interface (HMI) screen layout for ACS, INT and VMS:
 - a. Indicate proposed screen hierarchy, navigation, graphical symbols and colors used.
 - b. Include proposed text for point descriptions, alarms, and status messages. Text and graphics shall be approved prior to data entry.
 - 4. Security Alarm Integration: Provide an example of the proposed integration of alarms between access control and video surveillance systems.
 - 5. Network Cyber Security: Provide a detailed description of the network cyber protection steps proposed to ensure cyber security, including, but not limited to, whitelisting authorized IP addresses, blocking unnecessary network services, eliminating access to the public Internet, changing default passwords, etc.
 - a. Provide specific steps to be implemented and proposed example password(s) to be used.
- E. Operation and Maintenance Manuals: As specified in Section 017823 - Operation and Maintenance Data.
- F. Test Submittals: As specified in Section 017823 - Operation and Maintenance Data and Section.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 1. Cable installer must have on staff a registered communication distribution designer (RCDD) certified by Building Industry Consulting Service International.
- B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. In accordance with NFPA 70, National Electrical Code.
- D. In accordance with SIA DC-01, SIA DC-03, and SIA DC-07.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Electronic components:

1. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers.
2. Maintain ambient temperature between 50 degrees Fahrenheit and 85 degrees Fahrenheit (10 degrees Celsius and 30 degrees Celsius), and not more than 80 percent relative humidity, noncondensing.
3. Open each container; verify contents against packing list; and file copy of packing list, complete with container identification, for inclusion in operation and maintenance data.
4. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

1.08 PROJECT CONDITIONS

A. Environmental conditions:

1. System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Indoor, controlled environment: NEMA 250, Type 12 enclosure.
 - 1) System components installed in temperature-controlled indoor environments shall be rated for continuous operation in ambient conditions of 36 degrees Fahrenheit to 122 degrees Fahrenheit (2 degrees Celsius to 50 degrees Celsius) dry bulb and 20 percent to 90 percent relative humidity, no condensing.
 - b. Enclosures installed outdoors or indoors in spaces that are not conditioned:
 - 1) For enclosures with electronic components when noted or if required to meet panel components temperature ratings:
 - a) Provide NEMA 4X side-mounted or top-mounted closed-loop air conditioning unit. Size the unit to maintain temperatures inside the enclosure to no more than 45 degrees Celsius with an ambient temperature of 50 degrees Celsius in full sun, derated for an altitude of 2,250 feet, and the equipment operating at full load.
 - b) Air conditioner power: 120V, provided by an external circuit, for loads not to exceed 15A.
 - (1) For loads greater than 15A at 120V, notify Engineer and request direction.

PART 2 - PRODUCTS

1.01 MANUFACTURERS

- A. ACS: Genetec (existing system).
- B. VMS: Genetec (existing system).

C. Cameras: Hanwha, AXIS or approved equal.

1.02 MATERIALS

- A. Materials specified are considered the minimum acceptable for the purposes of durability, strength, and resistance to erosion and corrosion.
1. May propose alternative materials for the purpose of providing greater strength or to meet required stress limitations.
 - a. Alternative materials must provide at least the same qualities as those specified for the purpose.
 - 1) If alternatives are proposed, the proposals shall be accompanied with documentation supporting the claimed superiority of the proposed substitutions.
 - b. Owner Representative shall be the sole decider in the equivalency of alternative materials of construction.
- B. Materials substitutions:
1. The equipment chosen for this Work has been selected by the Owner Representative and the Engineer, to be included in this Work, based upon product performance and integration with existing Owner existing security equipment.
 2. No substitutions will be accepted unless otherwise noted. Any substitutions must be submitted for approval prior to installation.

1.03 ACS SERVER

- A. Access Control System Server (existing)

1.04 ACCESS CONTROLLER

- A. System Controller Panels: Provide sufficient controllers and input/output boards to meet all requirements of specifications:
1. Controller: Where new controllers are required provide the following:
 - a. Intelligent multi door controller, application software, with a flash ROM module, power supply, battery standby, and Communications Module, as described herein.
 - b. Review drawings and specifications with the Owner Representative and propose changes to the topology of the system based on device layout, where such changes improve performance or functionality of the system.
 - 1) Owner Representative has final authority as to the final approach for system topology.
 - c. Reader Support: Controller shall be configurable for multiple doors, supporting readers for ENTRY and/or EXIT at all doors. Enclosure, controller board, and accessories shall be the same manufacturer for consistency in system hardware layout.
 - d. Controllers shall be field upgradeable through firmware upgrade. Controllers shall be capable of upgrading the firmware through the

- software without requiring the need to access each controller to upgrade the firmware.
- e. High security supervised alarm points with 1k/2k resistors.
- f. Configurable output relays.
- g. The controller shall support Entry and Exit readers at all controlled doors.
- h. The controller shall be capable of maximum of 1,000,000 users with Five clearances, one card/person, 20-digit card.
 - 1) Mount board in the controller cabinet and connect to the controller board via an expansion bus cable.
- i. Controllers shall utilize flash downloadable firmware that may be updated from the server as manufacturer updates are released.
- j. UL listed.
- k. Approved Manufacturer: Mercury LP1502
- 2. Relay module:
 - a. Sixteen (16) configurable as input, and two (2) form C Relays supervised input with EOL resistors.
 - 1) UL 294 Recognized, FCC Part 15 Class A, CE Compliant
 - 2) Approved Mercury I/O Input Interface Panel

1.05 CARD READERS, CREDENTIAL CARDS

- A. Furnish and install card reader with dual format Reader as shown on Drawings and specified herein.
 - 1. The card access reader shall be compatible with the card access controller as selected and with the Owner Representative's current access credential.
- B. Reader Connections: Controllers communicate with readers in the following ways, depending upon readers used, distance and wiring conditions:
 - 1. Direct Wiegand cabling and data to the main controller board.
 - 2. RS485 OSDP communications between OSDP readers and controller. Supports Entry and Exit readers at doors, extended distances and card data encryption between reader and controller.
- C. Reader Configuration Signo card reader:
 - 1. Furnish and install card reader with integral keypad as indicated on the Drawings and specified herein.
 - 2. Detection Range: iCLASS Card, 1.6-inch (4 cm).
 - 3. Dimensions: 3.15-inch by 4.78-inch by .77-inch.
 - 4. Current Draw: 250 mA (peak power draw), 65 mA (standard power mode) at 12V dc to 24V dc.
 - 5. Transmit Frequency: 13.56-kHz.
 - 6. Color: Black.
- D. Product: HID Signo card reader with base part number 40.
 - 1. Configuration compatible with site.

1.06 DOOR AND GATE HARDWARE INTERFACE

- A. Electric Latches, locks and strikes: Coordinate access-controlled door hardware including electric latches, locks, exit device and strikes with door hardware schedule and as specified in Section 087100 - Door Hardware.

1.07 RECESSED DOOR ALARM SWITCH

- A. General: recessed-mounted, balanced magnetic reed switch for door intrusion detection shall be provided:
 - 1. Type: Form C contacts, closed loop.
 - 2. Voltage: 200VDC maximum.
 - 3. Current: .500 maximum.
- B. Physical:
 - 1. Hermetically sealed electronics and magnet-sealed within a plastic housing, suitable for indoor locations.
 - 2. For recessed mounting in door and door frame.
 - 3. Mounting hardware shall be provided.
 - 4. Performance Gap Distance: 1-inch or less.
- C. Manufacturer and Product: GRI 180 Series or approved equal.

1.08 WIDE-GAP SURFACE-MOUNT DOOR ALARM SWITCH

- A. General: heavy-duty surface-mounted for gate and access hatch intrusion detection shall be provided:
 - 1. Type: NO/NC contacts.
 - 2. Voltage: 200V dc maximum.
 - 3. Current: 0.50 A maximum.
 - 4. Power: 10 W maximum.
 - 5. UL and ULC approval.
 - 6. Leads as Required for Installation: 3 feet minimum.
- B. Physical:
 - 1. Hermetically sealed electronics and magnet-sealed within a die-cast aluminum housing, suitable for indoor and outdoor wet locations.
 - 2. For surface mounting to gate applications or to access hatch cover and frame.
 - 3. Mounting hardware shall be provided.
 - 4. Performance Gap Distance: 2.5-inch or less.
- C. Manufacturer and Product: George Risk Industries (GRI) 4400 Series or approved equal.

1.09 REQUEST TO EXIT DEVICES

- A. Furnish and install Request-To-Exit (Motion Sensor) PIR with wraparound coverage as indicated on the Drawings and specified herein:
 - 1. Current draw: 0.026A at 12V dc.
 - 2. Relay latch time: Adjustable to 60 seconds.
 - 3. Alarm output: 2 form C relay contacts.
 - 4. Coverage area: 8 feet by 10 feet.
- B. Manufacturer and Product: Bosch DS 160i or approved equal.

1.10 VIDEO SURVEILLANCE

- A. Video Surveillance System Server and Recorder. Add New Streamvault.
 - 1. Size the unit: 45 days recording, 20FPS Motion recording and 7FPS continual, 45% Motion. And half again the Storage for future additions.
 - 2. Channel License for the cameras on this project as well as half again for future additions.
- B. Fixed Interior 2 Channels Dome camera:
 - a. Furnish and install Indoor fixed IP security dome camera 3.54-6.69mm motorized w/IR as specified in this following.
 - b. Hardware and system specifications:
 - 1) Manufacturer: PNM-1202RVD or approved equal.
- C. Multi Imager Dome 16MP
 - a. Furnish and install Multi directional along a circular track IP security dome camera 16MP 3.3-5.7 lens w/IR motorized zoom/focus.
 - b. Hardware and system specifications:
 - 1) Manufacturer: PNM-C16083RVQ or approved equal.
- D. Multi Imager w/PTZ Exterior 34MP
 - a. Furnish and install Outdoor Multi Directional moment along a circular track IP security dome camera 34MP 120dB, 4.44-142.6mm, w/IR, Auto Tracking
 - b. Hardware and system specifications:
 - 1) Manufacturer: PNM-C34404RQPZ or approved equal.

1.11 NETWORK EQUIPMENT

- A. Ethernet switch: The network switches are Owner furnished. Security provides installation and connections to Security Equipment.

- B. Ethernet surge protection unit – single port:
1. Furnish and install Ethernet surge protection for all Ethernet connections to devices mounted outdoors. Protected devices shall include, but not be limited to IP video cameras, etc.
 2. Point of use surge protector to be installed at the network switch end and equipment end of devices, in accordance with manufacturer's instructions.
 3. Characteristics:
 - a. Port: Single port.
 - b. Service Voltage: 48V.
 - c. Clamping Voltage: 72V.
 - d. Protection Modes: Line-ground, line-line.
 - e. Surge Current Rating: 20,000A per pair.
 - f. Power Handling: 144W.
 - g. Data Rate: 1,000 Mbps.
 - h. Connection Method: Shielded RJ45 in/out; compatible with CAT6 cabling.
 - i. PoE+ compatible.
 - j. Operating Temperature: Minus 40 degrees C to plus 70 degrees C.
 4. Manufacturer: Ditek DTK-MRJPOES or approved equal.

1.12 CABLES

- A. General cable requirements: Comply with requirements in Division 16 and as recommended by system manufacturer for integration requirement.
- B. Unless otherwise noted, all materials and equipment shall be new, of the type, capacity, and quality specified and free from defects. Material shall bear the label of, and be listed by, the Underwriters' Laboratories (UL) unless of a type for which label or listing service is not provided.
- C. Materials shall be of same brand or manufacturer throughout for each class of material or equipment, wherever possible.
1. Data/Signal Composite Cabling – CR Door - Type A: Plenum - CMP – Stranded Three (3) Pair 22AWG, Four (4)18AWG conductors, Four (4) 22AWG conductor non-shielded, Two (2) 22AWG conductors or approved equal.
 - a. Manufacturer Belden, West Penn or approved equal.
 2. Signal Cabling – Input Device – Type B: Plenum – CMP Two (2) 18AWG strand Conductors.
 - a. Manufacturer Belden, West Penn or approved equal.
- D. Refer to the Drawings for cable manufacturer(s) and suggested products.

1.13 WIRE MARKERS

- A. Each power and control conductor shall be identified at each terminal to which it is connected. Conductors size No. 1 AWG or smaller shall have identification sleeves.
 - 1. Conductors No. 2 AWG and larger shall use cable markers of the locking tab type. Tabs shall be white plastic with conductor identification number permanently embossed.
- B. Conductors shall be identified as specified in this Section. Adhesive strips are not acceptable.
- C. The letters and numbers that identify each wire shall be machine-printed on sleeves with permanent black ink with figures 1/8 inch high.
 - 1. Yellow or white tubing and sized to fit the conductor insulation.
 - 2. Shrink the sleeves with hot air after installation to fit the conductor.
- D. Manufacturer:
 - 1. TMS Thermofit marker system: Raychem Co.
 - 2. Sleeve style wire marking system: W. H. Brady Co.
 - 3. Approved equal. Altronix, LifeSafety or approved Equal

1.14 ENCLOSURES

- A. Unless otherwise noted on Drawings or in these Specifications, provide enclosures as follows:
 - 1. Rack mountable w/ Internal quick Connect Terminals
 - 2. UL294, UL1076 | ULC S319 | CSA C22.2 #107.1 | FCC Part 15 | CSFM
 - 3. 2U rack mount (19.00"W x 3.50"H x 20.50"D) | Weight 24 lbs. | Z bracket wire management articulating arm
 - a. Manufacturer: Altronix, LifeSafety or approved equal.

1.15 EQUIPMENT HARDWARE

- A. Hardware for outdoor equipment: Type 316 stainless steel unless otherwise indicated on the Drawings.
- B. Hardware for indoor equipment: Galvanized steel, or 316 stainless steel.
- C. Zinc or cadmium plated hardware is not acceptable.
- D. Hardware shall include, but not be limited to, enclosure door handles, hinges, latches, bolts, nuts and other items.
- E. This provision shall take precedence over hardware provisions specified in other Sections of Division 16, Electrical.

1.16 CORROSIVE AREA EQUIPMENT

- A. For all equipment mounted exposed in corrosive areas, including conduits, cabinets, disconnects, etc. provide anti-corrosive paint suitable for the specific corrosive agent and/or enclosures of type NEMA 4X, Type 316 stainless steel or fiberglass where specified.

1.17 EQUIPMENT IDENTIFICATION

- A. Nameplates shall be installed on control panels and network racks, as well as all security components, including but not limited to, card readers, cameras, network racks, network switches, and patch panels where control function is not self-evident.
- B. Nameplate shall adequately describe the item and its function or use of the particular equipment involved—do not use the word “SECURITY” in any nameplate nomenclature. Final labeling designations shall be coordinated with the City Representative.
- C. Nameplate material shall be laminated phenolic plastic, black front and back with white core, engraved and fastened with stainless steel sheet metal screws.

PART 3 - EXECUTION

3.01 GENERAL

- A. Refer to the National Electrical Contractors Association’s (NECA) National Electrical Installation Standards (NEIS) for Standard Practices for Good Workmanship in Electrical Contracting (NECA-1) as a minimum baseline of quality and workmanship for installing electrical products and systems that defines what is meant by “neat and workmanlike” in accordance with National Electrical Code Section 110-12.

- 1. Specified requirements supersede NECA practices.

3.02 EXAMINATION

- A. Prior to commencement of work required under this Section and related sections, the Contractor shall review the Drawings and inspect the Site.
 - 1. Such inspection shall verify that necessary rough-in work has been correctly completed so as to allow for the proper installation of materials and methods, in accordance with the requirements of this specification.
 - B. Examine conduit and raceway pathways intended for cables. Check raceways, cable trays, and other elements for compliance with space

allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

- C. Verify spaces, dimensions for devices, equipment, panels, etc., furnished under this Division, and equipment furnished under other sections.
- D. Obtain necessary rough-in data and dimensions for work to be performed under this Division.
- E. Maintain headroom clearances and accessibility, as well as ceiling heights. Maintain clear space directly above ceilings unless specifically approved by the City Representative.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

- A. Comply with recommendations in SIA CP-01.
- B. Comply with TIA/EIA 606-A, Administration Standard for Commercial Telecommunications Infrastructure.

3.04 SERVICE CONTINUITY

- A. Maintain continuity of electric, network, and security services to functioning portions of the plant.
- B. Make no outages without prior written authorization of the Owner Representative.
- C. Include costs for temporary wiring and overtime work required in the Contract Price.
- D. Remove temporary wiring at the completion of the Work.

3.05 EMERGENCY POWER

- A. Connect devices that have a relationship to the ACS, INT and VMS systems and require power to operate, to the emergency power source at power supplies, junction boxes, and receptacles wherever feasible.
 - 1. Provide wiring and connections to each component noted on these drawings.
- B. Coordinate electrical 120V AC power as specified in Division 16 - Electrical.
 - 1. Panel and device locations as indicated in the Drawings and Specifications.

3.06 GROUNDING

- A. Comply with Section 260526 - Grounding and Bonding.
- B. Comply with IEEE 1100, Recommended Practice for Power and Grounding Electronic Equipment.
- C. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- D. Bond shields and drain conductors to ground at only one point in each circuit.

3.07 SHIPMENT AND STORAGE

- A. Supplier shall provide Contractor with detailed recommendations and instructions for equipment storage.

3.08 SUPPLIERS FIELD SERVICES

- A. Supplier shall provide assistance during equipment installation as required by the Contractor.
- B. The Supplier shall provide the Contractor with detailed recommendations and instructions for installation of the equipment specified in this Section.
- C. Contractor shall have a factory-trained engineer available to assist and supervise system installation personnel.
- D. Following installation, Supplier shall provide Certificate of Proper Installation.

3.09 INSTALLATION

- A. The equipment shall be aligned, connected, and installed at the locations shown and in accordance with the recommendations of the Supplier.
- B. Contractor shall install systems in a manner that is consistent with the provisions and intent of the Specifications, the Drawings, and the referenced Codes and Standards, and in accordance with equipment Suppliers written Specifications and instructions.
- C. Installation workmanship shall be accomplished in a neat and professional manner, meeting industry standards.
 - 1. This includes, but may not be limited to:
 - a. Furnishing proper grounding of data lines and devices.
 - b. Providing neat wire and cable routing.
 - c. Identification of cables and/or conductors by point numbers.

- d. Providing secure wire terminations, splices, ease of access for maintenance and testing, plumb and level installation of devices, etc.
- D. In the event of a discrepancy, immediately notify the Owner Representative through the use of a Request for Information form.
 - 1. Do not proceed with installation in areas of discrepancy until such discrepancies have been resolved, and written notice has been issued to proceed.
- E. Contractor shall fully inform themselves regarding peculiarities and limitations of spaces available for installation of work under this Division.
 - 1. The Drawings indicate desired location and arrangement of equipment and other items and are to be followed as closely as possible.
 - 2. Work specified and not clearly defined by the Drawings shall be installed and arranged in a manner satisfactory to the Owner Representative.
 - 3. Coordinate locations and space requirements with the Owner Representative.
 - F. Coordinate with the work of other onsite contractors to prevent interference with this installation.
 - 1. Notify the Owner Representative when interference is noted.
 - 2. Do not proceed with work until interference is resolved by the Owner Representative.
 - G. The Contractor shall verify that suitable environmental conditions exist in equipment locations, prior to mounting security equipment.
 - 1. If necessary, notify the Owner Representative if inadequate environmental conditions exist prior to installation of equipment.

3.10 CABLING

- A. Comply with NECA 1, Good Workmanship in Electrical Construction, and TIA 569-B, Commercial Building Standard for Telecommunications Pathways and Spaces.
- B. Install cables and wiring according to requirements in Section 270526-grounding and Bonding for Communications System.
- C. Cable requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
- D. Inspect network cables ensuring techniques, practices, and methods that are consistent with Category 6 (Cat 6) rating of components and fiber-optic rating of components, and that ensure Cat 6 and fiber-optic performance of completed and linked signal paths, end to end. (Owner Provided)

- E. Patch Cables for CAT6 devices are the responsibility of the Security Contractor.
- F. Boxes and enclosures containing security-system components or cabling shall use tamper-resistant screws.
- G. Install end-of-line resistors at the field device location and not at the controller or panel location.
- H. Connections to external wiring between field panels and system devices to be made on terminal strips within a terminal box or the equipment enclosure.
 - 1. Connections may be made either with terminal spade lugs set on the conductors with a special setting tool or with approved pressure-type terminal blocks.
 - 2. A terminal cabinet to be installed at each point where a circuit riser originates or at any point along a circuit where a tap is made.
- I. Wiring splices are not permitted.
- J. Conductors are not to be installed in the same outlet box, junction box, or conduit with conductors of lighting or power systems.
- K. Power and non-power limited wiring to be kept separate.
- L. Where fiber optic cabling is used, termination and patch cables are the Owner's responsibility.
- M. Where CAT 6 cables route from network racks, terminate onto patch panels and supply and install new patch cords for each connection.
- N. Install minimum No. 18 AWG cable from controller to electrically powered locks. Do not exceed 250 feet (75 meters).
- O. Install minimum No. 18 AWG ac or dc power wire from transformer or power supply to controller, with a maximum distance of 25 feet (8 meters).

3.11 CLEANING AND ADJUSTMENT

- A. The Contractor shall protect and, where necessary, cover installed devices to protect from dust and debris during construction.
- B. After other general construction work has been substantially completed, clean devices, fixtures, panels, and any equipment, material, surface, whether a part of this scope of work or not, which has been soiled as a result of work by the Contractor.
 - 1. Remove all dust, dirt, grease, or other marks.
 - 2. Leave work in clean condition daily, lunch and breaks.

3.12 FLASHING AND SEALING

- A. The General Contractor shall seal all penetrations through interior and/or exterior walls, ceilings, and floors.
- B. This sealing work shall be performed in accordance with applicable fire codes to maintain current fire ratings (where applicable) and shall be air and watertight (as specified in Division 26 - Electrical).

3.13 IDENTIFICATION

- A. In addition to requirements in this Article, comply with applicable requirements specified in Section 260519 - Low Voltage Wire Connections, and in accordance with TIA/EIA 606-A.
- B. Label each terminal strip and screw terminal in each cabinet, rack, or panel:
 - 1. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - 2. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.
- C. At completion, cable and asset management shall be reflect as-built conditions.

3.14 COORDINATION WITH OWNER REPRESENTATIVE-PROVIDED IT

- A. The Contractor shall coordinate with, and provide advance notice to, the Owner Representative IT department for Owner Representative IT requests.
- B. Software licenses must be coordinated with Owner Representative IT, so that the necessary Owner Representative software license key information is coordinated and that the software licenses are appropriate applied to the Owner Representative's software systems.
- C. Software programming must be coordinated with Owner Representative IT, so that the necessary access to Owner Representative servers is provided and coordinated.
- D. All device and system programming must be completed before functional testing can take place. Final testing and commissioning cannot occur until this is done.

3.15 RECORD DRAWINGS

- A. Site prints: The Contractor shall maintain a set of clearly marked red line prints of the Shop Drawings at the Site that shall be used for recording the work details, final size, location, interrelation, and similar items of work under this Section and related sections.
 - 1. Correct this set of drawings daily as the work progresses and clearly indicate changes to suit field conditions, including changes made by field order or change order, accurate dimensions, and precise locations of buried or concealed work, locations of concealed boxes, controls and devices and any deviations from the Shop Drawings.
- B. Upon completion of the work, incorporate into AutoCAD marks from the Site prints and produce 2 bond sets of Draft Record Drawings for use and verification during acceptance testing.
 - 1. The Draft Record Drawings shall utilize the latest Architectural background drawings and shall incorporate modified drawings as specified in this Section, or any other drawings which were developed by the Contractor during the installation process.
 - 2. Redline changes required to the Draft Record Drawings as a result of acceptance testing on these sets during the acceptance testing.
- C. Upon completion of the acceptance testing, incorporate into AutoCAD changes made during acceptance testing and deliver Record Drawings to the Owner Representative.

3.16 FIELD TESTING AND FACILITY STARTUP

- A. Field Testing and Facility Startup shall be in accordance with the testing sheets provided. Edit testing sheets as necessary to accommodate the ACS and VMS elements installed.
- B. Acceptance testing:
 - 1. The Contractor shall perform onsite Acceptance Testing with witness by a qualified representative of the Supplier and the Owner Representative, providing personnel and equipment necessary to perform these tests.
 - 2. Representatives from the Owner Representative's IT and Security departments shall be invited to participate in Acceptance Testing, so that they may witness the testing, should they choose.
 - 3. Any costs incurred by the Owner Representative as a result of canceling and rescheduling the Acceptance Testing, including time and reimbursable expenses incurred as part of the re-testing process, shall be the responsibility of the Contractor.
 - 4. The Contractor shall provide Draft Record Drawings (As-Built Drawings) to the Owner Representative, as specified in this Section.
 - 5. Upon completion of Acceptance Testing, the Owner Representative shall generate a punch list of deficient items.

- a. The Contractor shall have 10 business days, from receipt of the punch list, to resolve items included in the punch list.
6. Upon completion of Acceptance Testing, the Contractor shall have 10 business days to incorporate redline changes made to the Draft Record Drawings and to submit to the Owner Representative for verification as specified in this Section.
7. Upon completion of punch list items, the Contractor shall perform follow-up onsite Acceptance Tests with witness by the Owner Representative.
 - a. If there are deficiencies remaining after the follow-up testing that require further testing by the Owner Representative, then the costs incurred by the Owner Representative for the additional follow-up tests, including time and reimbursable expenses, shall be the responsibility of the Contractor.
8. Upon completion of the follow-up testing and delivery and acceptance of the Record Drawings, the work shall be considered complete, and the warranty period shall begin as specified in this Section.
- C. Maintenance agreement: The Contractor shall be responsible for maintenance of installed equipment during the warranty period following system acceptance at no expense to the Owner Representative.
 1. Maintenance of the system shall include an annual cleaning of equipment installed as part of this contract prior to expiration of the warranty.
 2. Any patches and software upgrades of critical nature shall be the responsibility of the Security Contractor
 3. The warranty shall include Firmware updates prior to expiration.
 4. Do not include in the base bid any provisions for additional maintenance beyond the warranty period.
- D. Photo documentation: Provide photos as indicated below for Owner Representative acceptance:
 1. Card reader doors - field devices:
 - a. Provide photo of the unsecured side of the door, including all devices (photo to be taken from ground to include surrounding area and labeling, from 3 to 8 feet distance).
 - b. Provide photo of secured side of door, including all devices (photo to be taken from ground to include surrounding area and labeling, from 3 to 8 feet distance).
 2. Monitored doors:
 - a. Provide photo of the door contact (photo to be taken from 1 foot to 3 feet distance).
 - b. Provide photo of the inside and outside of the door (photo to be taken from 1 foot to 3 feet distance).
 - c. Provide photo of the secured side of the door, including all devices (photo to be taken from 3 to 8 feet distance).
 3. Security panels:

- a. Provide photo of panel layout with doors closed and wall location (photo to be taken from 3 to 8 feet distance).
- b. Provide photo of interior of panel with door open (photo to be taken from 3 to 8 feet distance).
4. Video surveillance system:
 - a. Video surveillance network switch(es) showing switch and port number (photo to be taken from 1 foot to 3 feet distance).
 - b. Image of each camera's mounting location once installation is complete (photo to be taken from ground to include surrounding area and labeling, taken from 3 feet to 8 feet distance).
 - c. Snapshot view of each camera's image from video management software.
 - d. Devices and circuits will be considered defective if they do not pass tests and inspections.
 - e. Prepare test and inspection reports.

3.17 STARTUP SERVICE

- A. Engage a factory-authorized service representative to supervise and assist with startup service:
 1. Complete installation and startup check according to approved procedures that were developed in Article 3.03 - Preparation, and with manufacturer's written instructions.
 2. Enroll and prepare badges and access cards for operators, management, and security personnel.

3.18 TRAINING

- A. Conduct operations on the systems prior to system acceptance. Training to be performed for durations indicated in the Technical Specifications:
 1. Provide a minimum of 2 hours total training.
 2. Training to consist of basic overview training for general use and system operation.
- B. The overall training shall demonstrate as a minimum the installation, associated O&M manuals, startup, shutdown, periodic testing, emergency operation, and troubleshooting. Also, this training plan shall include, but not be limited to:
 1. Knowledge transfer process.
 2. System administration (digital video management system).
 3. System configuration and expansion (adding software license, servers, etc.).
 4. System maintenance (diagnostics, tuning, backup and recovery, upgrades, patches).
 5. Producing reports (system, audit, management).
 6. Configuration of system parameters.

- C. Provide a training outline for approval by the Owner Representative 1 month prior to commencement of training.
 - 1. In addition to training materials, provide student workbooks for each trainee.
 - 2. Workbook format and content shall also require approval by the State prior to the start of training sessions.
 - 3. Training past completion of contract (final payment) should be arranged by the Owner Representative by separate agreement.

3.19 PROTECTION

- A. Maintain strict security during the installation of equipment and software.
 - 1. Lock and secure rooms housing the control station, and workstations that have been powered up, with an activated burglar alarm and ACS reporting to a central station complying with UL 1610, Central-Station Burglar-Alarm Units, during periods when a qualified operator in the employ of Subcontractor is not present.

END OF SECTION

SECTION 28 31 11
ADDRESSABLE FIRE ALARM SYSTEM

PART 1 GENERAL

1.01 SUMMARY

- A. Scope: This work includes designing and providing a new, complete, addressable fire alarm system with partial emergency communication also as described herein and on the Contract Drawings. The system shall include all wiring, raceways, pull boxes, terminal cabinets, outlet and mounting boxes, control equipment, alarm and supervisory signals, initiating devices, alarm and emergency communication notification appliances, interfaced equipment, and all other accessories and miscellaneous items required for a complete code compliant operating system even though each item is not specifically mentioned or described.

1.02 RELATED DOCUMENTS

- A. Drawings and General Provision of Contract, including General and Special Conditions and Division 01, General Requirements Specification section, apply to work of this section.
- B. Related Sections:
1. Section 01 33 00, Submittal Procedures.
 2. Section 26 00 00, Electrical General Requirements.
 3. Section 26 00 10, Electrical Summary of Work.

1.03 DEFINITIONS

- A. FPE: Fire Protection Engineer.
- B. Furnish: To supply the stated equipment or materials.
- C. Install: To set in position and connect or adjust for use.
- D. NFPA: National Fire Protection Association.
- E. NICET: National Institute for Certification in Engineering Technologies.
- F. OSHM: Office of Safety Health and Environmental Management.
- G. Provide: To furnish and install the stated equipment or materials.
- H. UL: Underwriters Laboratories.

1.04 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures. Any work performed by the contractor prior to their approval will be at the contractor's own risk. If such work is contrary to applicable codes and contract documents, the contractor shall bear all costs including, but not limited to, demolition, reconstruction, and all costs and expenses associated with revising the fire alarm system to meet all applicable codes and contract document requirements.
- B. System Description: Submit a detailed description of the control panel as it shall operate for this specific installation. General system descriptions from the catalog cuts and copies of the Systems Design Operation portion of this specification will not be acceptable.
- C. Equipment: Include annotated catalog data showing manufacturer's name, model, voltage, and catalog numbers for all equipment and components of the following:
 - 1. Fire Alarm Control Panel (FACP) (Including Printers, interface modules, Covers, Console Rack, Video Display Unit, amplifier panels etc.).RS232 interface to integrate Alertus emergency notification devices and building vendor equipment fire alarm system.
 - 2. Strobe Power Extender Panels.
 - 3. Storage Batteries.
 - 4. Battery Charger.
 - 5. Cabinet.
 - 6. Manual Pull Station.
 - 7. Addressable Interface Devices.
 - 8. Terminal Cabinets/Assemblies.
 - 9. Addressable Relays and Interface Modules.
 - 10. Graphic Annunciator Panel.
 - 11. Annunciation devices (speakers, Horn/strobes, bells, etc.).
 - 12. Fire Detector (smoke, heat, flame, etc.).
 - 13. Carbon monoxide detectors
 - 14. Natural gas detectors
 - 15. Waterflow Switch.
 - 16. Tamper Switch.
 - 17. Electromagnetic Door Holder.
 - 18. Remote Fire Alarm Control Unit.
 - 19. Wire.
 - 20. Boxes.
 - 21. Terminal strips.
 - 22. Relays.
 - 23. Transient Voltage Surge Suppressors.
 - 24. Conduit.

25. Support.
- D. Shop Drawings: Shop Drawings shall be prepared on a Computer Aided Drafting (CAD) System. As a minimum, the Shop Drawing submittal shall include the following:
1. Interior wiring diagram for FACP.
 2. Provide point-to-point wiring diagrams on floor plans at a scale of not less than 1/8 inch = 1 foot – 0- inch (1:100), showing all field devices (indicating and initiating devices, relays, switches, etc.), field interconnections, the routing of conduit and circuits between devices, electrical boxes, terminal cabinets, risers, and the FACP. All device circuit numbers and addresses shall be indicated.
 3. Field wiring color code scheme.
 4. Locations for all ceiling mounted equipment shall be coordinated with lighting fixtures, air outlets, ductwork and other fixtures. All detectors shall be centered and aligned with ceiling tiles and/or other ceiling mounted devices.
 5. Provide complete riser diagrams indicating the wiring sequence of all devices and their connections to the control equipment. Provide a color code schedule for the wiring. Provide floor plans showing the location of all devices and equipment.
 6. Provide detailed drawings of the graphic annunciator.
 7. Detailed sequence of operations and matrix.
- E. As-Built (Record) Working Drawings: On a daily basis the contractor's superintendent shall record as-built conditions on a set of Shop Drawings maintained at the job site. Two sets of Shop Drawings reflecting as-built conditions shall be available prior to and for use in the final acceptance test. Two weeks after the acceptance test and before final acceptance of the work, furnish four complete sets of as-built drawings. The Drawings shall include:
1. As-built location of all devices and equipment. Device addresses shall be listed next to each device.
 2. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
 3. Riser diagram.
 4. All deviations from the Project Drawings and approved Shop Drawings.
- F. Device Addresses: Prior to fire system installation provide for approval a complete list of device addresses with corresponding commands, controls, and sequence of operation.
- G. Qualification Data: For Designer and Installer.

- H. Strobe and Voice Evacuation Circuit Labels: Prior to fire system installation provide for approval a complete list of area descriptions for strobe and voice evacuation circuits to be labeled on the fire alarm panel.
- I. Descriptions on Graphic Annunciators: Prior to fire system installation, provide descriptive labels for graphic annunciator labeling which will include strobe and voice evacuation zones, sprinkler zones, sprinkler valve locations, HVAC zones, fire walls, stairwells, and elevators.
- J. Service Manuals and Equipment Descriptions: Thirty days prior to the final acceptance test and after the preliminary testing has been completed submit the following:
 - 1. Complete service manuals to include: Device and board specifications, operation, installation, and maintenance manual; manufacturers installation instructions for all aspects of the installation; Walktest Operating Instructions; manufacturers wiring specifications for the system; training manual.
 - 2. Maintenance checklists for equipment.
 - 3. As-built circuit diagrams, complete with color-code scheme, and device descriptions.
 - 4. Complete parts list by make model number and manufacturer.
 - 5. List of smoke detector addresses and corresponding sensitivity readings.
 - 6. Copies of approved submittal materials.
- K. Calculations: Submit substantiating battery calculations for supervisory and alarm power requirements. Ampere-hour requirements for each system component and each panel component shall be submitted with the calculations. Calculations shall include:
 - 1. Battery capacity calculations.
 - 2. Supervisory power requirements for all equipment.
 - 3. Alarm power requirements for all equipment.
 - 4. Power supply rating justification showing power requirements for each of the system power supplies.
 - 5. Voltage drop calculations for NAC wiring runs demonstrating worst-case condition. Show capability of 25 or 70.7 vrms circuits for wire runs.
 - 6. Provide complete battery calculations for both the alarm and supervisory power requirements. Ampere hour requirements for each system component shall be submitted with the calculations.
- L. FACP Wire Chart: Prepare a system wire chart. Chart every wire showing the wire number, color, size, type of circuit, designation, origination point and termination point. The format of the wire chart shall be as shown on the

Contract Drawings. Provide one copy of the wire chart in a sealed plastic envelop inside the fire alarm control panel.

- M. Terminal Cabinet Wire Chart: Prepare a wire chart of the wires in each terminal cabinet. Chart every wire showing the wire number, color, size, type of circuit, designation, origination point and termination point. The format of the wire chart shall be as shown on the Contract Drawings. The chart must be protected with a clear laminate and mounted in each cabinet so that it does not interfere with the wiring or terminals.
- N. Work Schedule: All work must be coordinated with facility operations. A work schedule must be submitted for approval prior to initial work.
- O. Certificate of Compliance: Within 2 weeks after passing the acceptance test submit a certificate of code and contract compliance in accordance with NFPA 72, paragraph 1-7.2.1.

1.05 SYSTEM DESCRIPTION

- A. The System shall be a complete, supervised, noncoded, addressable fire alarm system with audible/visual notification via Alertus wall mounted integrated audible/visible notification device, 24V DC via RS232 ethernet connection , intelligent analog alarm initiation via double action manual pull stations and photoelectric smoke detection initiation, and complying with all aspects of the applicable documents listed herein.

1.06 PERFORMANCE REQUIREMENTS

- A. Comply with NFPA 72 and all contract documents and specification requirements.
- B. The system shall be classified as a proprietary protective signaling system.
- C. Control features:
 - 1. The system fire alarm control panel (FACP) shall be tied-to the central monitoring system.
 - 2. Any intelligent analog smoke detector or conventional smoke detector zone shall include a selectable alarm confirmation capability. Alarm conditions on these devices are processed through a confirmation period of 45 seconds. Over the next 300 seconds, a signal justification period is initiated where any subsequent alarms are reported immediately.
 - 3. A subprogram shall be provided to allow environmental compensating for smoke detector sensitivity. Each smoke detector shall be programmed with this capability.
 - 4. The system shall provide a field test function where one person can test the complete system or a specified area at the fire alarm control panel

while maintaining full operational function of other areas not under test. Alarms, troubles, device types, and the initiation device addresses shall be logged to the system printer and historical memory.

5. Provide a double action manual pull station attached to the fire alarm control panel that activates the general alarm. Resetting the manual pull station (and all other activated alarms) will cause the general alarm to cease operating SWBNO must approve the final sequence of operation.
6. Provide program capability via switches or buttons in a locked portion of the fire alarm control panel to bypass the notification appliance circuits, air handler shutdown, smoke control operation, elevator recall, fire door release, and door unlocking features. Operation of these switches or buttons shall indicate this action as a supervisory signal on the FACP display and printer output.
7. History Logging - recirculating last 500 events, minimum. History shall be downloadable by classification for selective event reports.

D. Supervision:

1. Style B initiating device circuits.
2. Style 4 signaling line circuits for each floor.
3. Style 7 signaling line circuits for the network.
4. Class B notification appliance circuits.
5. Provide electrical supervision of the primary power (AC) supply, presence of the battery, battery voltage, and placement of system modules within the control panel.
6. Provide electrical supervision of the circuits leading to interfacing modules for the monitoring of contact type initiation devices, the control of electrical devices, fire pump controllers, load control relays (controlling elevators and HVAC equipment), and each independent smoke detection, kitchen, and gaseous fire suppression systems.

E. Spare capacity:

1. All installed signaling line circuits and notification appliance circuits shall have a minimum of 20 percent spare capacity.
2. All amplifiers shall have a minimum of 20 percent spare capacity.
3. Battery size shall be a minimum of 125 percent of the calculated requirement.

- F. Alarm Functions: Fire alarm system functions and operations shall be as indicated on the Alarm Function Matrix included with the drawing package. Operation of an alarm initiating device shall cause the functions indicated on the matrix to occur as described below:
1. Sound General Evacuation Alarm: This function shall cause all strobe lights to activate and speakers in the building to sound a slow whoop for 3 cycles followed by the voice message.
 2. "May I have your attention please! May I have your attention please! A fire has been reported. Please walk to the nearest exit and leave. Do not use the elevators."
 3. This is repeated until the control panel is reset. After the digital message has ended, or if the digitally prerecorded message shall fail for any reason, the alarm signal shall revert back to a slow whoop which will continue until manually silenced. It shall also be possible to preempt the whoop signal or prerecorded voice evacuation message and sound a live message from the microphone at the Fire alarm Master CPU location on a floor by floor basis. All floors not selected for a manual message shall continue to receive the pre-recorded message or whoop signal.
 4. Initiate Pre-signal Alarm: This function shall cause an audible and visual alarm and indication to be provided at the FACP. Activation of an initiation device will be annunciated at the FACP only, without activation of the General Evacuation Alarm.
 5. Release Held-Open Fire Doors: This function shall cause all fire doors in the building which are held open by electrical hold-open/release mechanisms to be released and allowed to close.
 6. Unlock Time Delay Hardware on Exit Doors: This function shall cause a signal to be sent to all exit doors provided with electrically operated locks to become unlocked and free for egress.
 7. Shutdown Supply Fan Served: This function shall cause the air handling system supply fan to shut down.
 8. Initiate Smoke Management Sequence of Operation: The building HVAC system, Smoke Removal System is arranged to exhaust smoke from a fire area. The sequence of operation is described. The fire alarm system shall provide any and all such interfaces/control points as required to properly activate smoke management systems. Only the first fire alarm system initiating device to go into alarm condition will activate the smoke control functions. Any subsequent devices will have no effect on the smoke control mode. The exact quantities and locations of all such interface points shall be coordinated with the automatic control systems supplier.
 9. Close Smoke Damper: This function shall cause smoke dampers installed in HVAC systems to shut-down.
 10. Activate Fire Suppression System Served: This function shall cause a signal to be sent to an interface device to operate a solenoid and activate a fire suppression system.

11. **Illuminate LED on Device in Alarm:** This function shall cause an LED, integral to a device, to illuminate, indicating that the device is in alarm. For contact devices, such as sprinkler valve tamper switches, the LED shall be built into the intelligent system interface module monitoring the device.
 12. **Activate audio/visual signals and display address on the FACP:** This function shall illuminate an alarm indicating LED, sound an audible alarm, and display a device address at the FACP when the system is in an alarm condition. Signals shall also be transmitted to a computer control display system.
 13. **Transmit Event to Central Monitoring Station:** This function shall cause the event to be transmitted to the central monitoring station. The message sent shall include the location of origin and the identical message displayed on the fire alarm control panel LCD display board.
 14. **Print Address, Date, Time, and Type of Alarm:** This function shall cause the fire alarm system printer to print a message identical to that shown on the FACP LCD display board.
 15. **Activate Audio/Visual Signals and Address Display on Remote Panel or Graphic Annunciator Panel:** This function shall cause the event to be transmitted to a remote panel, whose location is shown on the Drawings. The message sent shall be the same message displayed on the FACP LCD display board.
 16. **Signal Confirmation:** This function shall cause the fire alarm control panel to reset the activated device and wait for a second alarm activation. Alarm conditions are processed through a confirmation period of 45 seconds. Over the next 300 seconds, a signal justification period is initiated where any subsequent alarms are reported immediately.
- G. **Trouble Functions:** Provide the following actions and indications at the FACP upon a single break, open condition, or ground fault on all supervised circuits which may prevent the required operation of the system:
1. **Annunciate at the FACP:** A yellow visual signal, audible alarm, and alphanumeric LCD display of type of trouble, and device address.
 2. The fire alarm system printer shall print a message identical to that shown on the LCD display on the FACP. In addition, the printed hard copy of the event shall indicate the date and time at which it occurred.
 3. Send a signal to the existing central monitoring system. This message shall include the building of origin as well as all information indicated to be displayed on the FACP.
 4. Send a signal to the remote panel shown on the Drawings. This message shall include the building of origin as well as all information indicated to be displayed on the FACP. The message sent shall be the same message displayed on the FACP LCD display board.

5. Fire suppression system control valves shall be supervised to ensure circuit integrity and open position. Closing a control valve shall cause a trouble condition.
 6. Each independent fire detection, and fire suppression system shall be monitored for trouble conditions. Each monitored condition shall be provided with a separate address.
- H. Fire Alarm Signal Initiation Shall Be By One Or More Of The Following Devices:
1. Manual pull station.
 2. Heat detector.
 3. Addressable area smoke detector.
 4. .
 5. Automatic sprinkler system water flow switch.
 6. Combustible Gas Detection System.
 7. Conventional initiation device zone (for legacy systems).
 8. Flame detector.
 9. Carbon Monoxide detector.
 10. Natural gas detector.
- I. Supervisory signal initiation shall be by one or more of the following devices or actions:
1. Operation of any non-fire system alarms as designated on the Matrix.
- J. System trouble signal initiation shall be by one or more of the following devices or actions:
1. Loss of primary power at the FACP.
 2. Ground or a single break in FACP internal circuits.
 3. Abnormal ac voltage at the FACP.
 4. A break in standby battery circuitry.
 5. Open circuits, shorts and grounds of wiring for initiating device, signaling line, and notification-appliance circuits.
 6. Failure of battery charging.
 7. Abnormal position of any switch at the FACP or annunciator.
 8. Amplifier failure
 9. Opening, tampering, or removal of alarm-initiating and supervisory signal-initiating devices.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Testing Services or Laboratories: Construct all fire alarm and fire detection equipment in accordance with the latest edition of the following publications from Underwriters Laboratories (UL)
 - a. UL Fire Protection Equipment Directory.
 - b. UL Electrical Construction Materials Directory.
 - c. UL 38, Manually Actuated Signaling Boxes for Use With Fire Protection Signaling Systems.
 - d. UL 228, Door Holding Devices.
 - e. UL 268, Smoke Detectors for Fire Protective Signaling Systems.
 - f. UL 268A, Smoke Detectors for Duct Application.
 - g. UL 464, Audible Signal Appliances.
 - h. UL 497A, Secondary Protectors for Communications Circuits.
 - i. UL 521, Heat Detectors for Fire Protective Signaling Systems.
 - j. UL 864, Control Units for Fire Protective Signaling Systems.
 - k. UL 1283, Electromagnetic Interference Filters.
 - l. UL 1449, Transient Voltage Surge Suppressors.
 - m. UL 1480, Speakers for Fire Protective Signaling Systems.
 - n. UL 1971, Signaling Devices for the Hearing Impaired.
 - o. FM Approval Guide.
 2. Codes and Standards:
 - a. International Building Code, Latest Edition.
 - b. Life Safety Code, Latest Edition.
 - c. NFPA 70, National Electrical Code.
 - d. NFPA 72, National Fire Alarm Code, 2019 Edition.
 - e. Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
 3. ASME/ANSI A 17.1, Safety Code for Elevators and Escalators.
- B. Qualifications of Installer: Design shall be by a NICET Level III or IV Technician or a Registered Fire Protection Engineer. Installer shall have an office, which has been in existence for at least 3 years, within a 75 mile radius of the project location. Installation shall be accomplished by an electrical contractor with a minimum of 5 years' experience in the installation of fire alarm systems of similar size and capacity. The services of a technician provided by the control equipment manufacturer shall be provided to supervise installation, adjustments, and tests of the system.
- C. Distributor/ Service Organization/ Designer Qualifications: Design Personnel certified by NICET as Fire Alarm Level III or IV. The manufacturer's equipment distributor shall show evidence of certification by the manufacturer in the technical support of the system installed under this contract.
1. The distributor shall show evidence of certification of at least one employee by the National Institute for Certification in Engineering Technologies (NICET) at Level III or IV in the Fire Alarm Systems subfield of Fire Protection Engineering Technology. If such a certified

individual is not employed, adequate documentation shall be provided to show comparable training and experience of an existing employee. At a minimum, comparable training and experience shall consist of ten years of progressive experience in the installation and design of fire alarm systems of similar size and complexity to that specified herein.

2. In lieu of an employee with NICET Level III or IV certification, the distributor shall show evidence of at least one employee with a minimum of ten years of progressive experience in the design of fire alarm systems and, in addition, the distributor shall show evidence of technical support in the design, installation, and testing of the systems from a manufacturer-affiliated company, which shall show evidence of certification of at least one employee by the National Institute for Certification in Engineering Technologies (NICET) at level III or IV in the Fire Alarm Systems subfield of Fire Protection Engineering Technology.
3. The Contractor shall furnish evidence that the fire alarm equipment supplier has an experienced and effective service organization, which carries a stock of repair parts for the system being furnished. Should the Contractor fail to comply with the service requirements of this section, the Owner will then have the option to make the necessary repairs and back-charge contractor without any loss of warranty as provided by the contract documents.

- D. 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.

1.08 DELIVERY STORAGE AND HANDLING

- A. Deliver products to project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, and shelf life if applicable.
- B. Store materials inside, under cover, above ground, and kept dry and protected from physical damage until ready for use. Remove from site and discard wet or damaged materials.

1.09 COORDINATION

- A. Coordinate sprinkler head layout with reflected ceiling plan and all ceiling – mounted equipment, including diffusers, lights, security cameras, fire alarm devices, exit signs, and other devices.
- B. Coordinate major equipment and piping layouts with other trades to avoid obstructions and excessive changes in direction for piping.

1.10 WARRANTY

- A. The Contractor shall guarantee labor, materials, and equipment provided under this contract against defects for a period of one year after the date of final acceptance of this work by the Owner and after the receipt of as-built drawings and schematics of all equipment.

1.11 EXTRA MATERIALS

- A. Spare parts shall be directly interchangeable with the corresponding components of the installed system. Spare parts shall be suitably packaged and identified by nameplate, stamping or tagging.
- B. Furnish the following spare parts. Quantity shall be two percent of the installed number of devices, but not less than the quantities listed:
 - 1. Smoke Detectors of each type installed: Five.
 - 2. Heat detectors: Two.
 - 3. Manual pull stations: Two.
 - 4. Visual devices: Five.
 - 5. Fuses for each fused circuit: Five.
 - 6. Electromagnetic door holder: One.
 - 7. Spare rolls of paper for the system printer: Nine (plus sufficient paper for all fire alarm acceptance tests).
 - 8. Lamps for each lamp type furnished: Five.
 - 9. Keys shall be provided for all fire alarm cabinets: Five.
 - 10. Wrenches or special tools required to gain access to all lockable equipment: Five.

PART 2 PRODUCTS

2.01 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:
 - 1. FACP, cabinets, and peripheral devices:
 - a. Edwards
 - b. FireLite.
 - c. Notifier.
 - d. Siemens.
 - e. Simplex Grinnell.
 - f. Gamewell.
 - g. FCI.
 - h. "Or-equal," approved.
 - 2. Wire and Cable: Comtran Corporation.

- a. Helix/HiTemp Cables, Inc.; a Draka USA Company.
 - b. Rockbestos-Suprenant Cable Corporation; a Marmon Group Company.
 - c. West Penn Wire/CDT; a division of Cable Design Technologies.
 - d. "Or-equal," approved.
3. Conduit:
- a. Allied.
 - b. Approved equal.
4. Boxes, supports, terminal blocks, and appurtenances:
- a. As per Section Division 26, Electrical.

2.02 FIRE ALARM CONTROL PANEL (FACP):

- A. The control panel shall be a UL listed Fire Alarm Control Panel with multiplex signaling service . All components shall be provided by one manufacturer. As the central control unit for the entire system, the control panel shall provide power, supervision, control, and logic, utilizing solid state, modular components, internally mounted and arranged for easy access. Each control unit shall be suitable for operation on a 120 volt, 60 Hz, normal building power supply.
- B. Cabinet: Install control panel components in cabinets large enough to accommodate all components and also to allow ample gutter space for interconnection of all panels as well as all field wiring. The enclosure shall be identified by an engraved laminated phenolic resin nameplate. Lettering on the nameplate shall say Fire Alarm Control Panel and shall not be less than 1-inch high. If multiple panels are provided, additional identification shall be provided on each nameplate to distinguish the panels. Provide prominent rigid plastic or metal identification plates for all lamps, circuits, meters, fuses and switches. The cabinet shall be provided in a sturdy steel housing, complete with backbox, hinged steel door with cylinder lock, and surface mounting provisions.
- C. Control/Display Modules: Provide power and control modules in the FACP to perform all functions described in this Specification.
1. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
 2. Non-volatile memory for system data base, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition.
 3. Visual indication of alarm, supervisory or trouble initiation on the fire alarm control panel shall be by liquid crystal display or similar means with a minimum of 80 characters of which at least 32 are field changeable.

4. LED display for "ALARM", "AUDIBLE SILENCED", "SUPERVISORY", "TROUBLE", and "POWER ON".
5. Switches or buttons for "ALARM ACKNOWLEDGE", "AUDIBLE SILENCE", "SUPERVISORY ACKNOWLEDGE", "TROUBLE ACKNOWLEDGE", and "RESET"
6. Programmable buttons or switches to perform custom functions such as drill, disable, bypass automatic control commands or other special functions as required by design.
7. Programmable panel mounted relays to be software programmed to perform control functions required for system operation.
8. Notification appliance circuits as required to supervise and operate all connected notification appliances. Operation of NACs shall be fully integrated with the FACP. Switches shall be used to activate or deactivate strobe circuits. Through the use of multi-colored LEDs, a clear indication shall be provided showing which circuits are active and to which strobe. The system shall be capable of operating all strobes at the same time.
9. Locate diodes and relays, if any, on screw terminals in the FACP.
10. Additional Requirements: The FACP shall have the following additional features:
 - a. System shall be UL 864 listed.
 - b. Field programmable.
 - c. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each detection zone to provide accessory functions as required.
 - d. Provide TROUBLE ACKNOWLEDGE, DRILL, and ALARM SILENCE switch.
 - e. Control panel shall have minimum 25 percent capacity for addition of future signaling line circuits and notification appliance circuits. Each installed circuit shall have 20 percent spare capacity.
 - f. Analog Loop Driver to allow for continuous interrogation of each addressable device in the building.
 - g. Communication with auxiliary devices, including waterflow switches, valve supervisory switches, door controls, etc. through the use of appropriate interface modules as indicated on the riser diagram and interface schematics.
 - h. The FACP shall be listed for releasing service and shall be listed for connection to a Central Station Signaling System service.
 - i. The FACP shall have drift compensation technology and shall be UL listed as a calibrated smoke test instrument.
 - j. Device history shall be stored at the FACP. At a minimum, the following information for each sensor shall be maintained: device history, sensitivity levels, alarm verification status, drift compensation data.
11. The FACP shall provide a minimum 500 event history log.

12. The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
13. Flow test shall be programmed as a software zone to permit de-activation of the audible alarms, and to activate and de-activate the flow test through the use of function keys at the panel.
14. All keys switches and panel buttons shall be programmed in accordance with the using agency's specific requirements.
15. The RS 232 serial port will be utilized to integrate the Alertus fire panel with integral ethernet connection and 24 hour battery backup for connection of the Alertus wall mounted alert beacons with integral audio visual notification devices.

2.03 FIRE DETECTORS

- A. Photoelectric light scattering type smoke detectors shall be provided as follows:
 1. The detector shall be suitable for two wire 24V dc operation and two way communications on the intelligent analog signaling circuit. Smoke detectors shall be UL listed for use with the FACP and environmental conditions
 2. Detectors shall be self-compensating for ambient temperature and humidity
 3. Detector bases shall be installed on an industry standard, 4-inch (101 mm) square or octagonal electrical outlet box. Bases shall be universal for ionization, heat, and photoelectric (light scattering type) detectors.
 4. Detectors shall be twist lock type on to the base with self-wiping contacts.
 5. Screw clamp terminals shall be provided for all conductor terminations
 6. The detector shall be addressed, tested and programmed prior to installation. The detector readout shall yield a discreet electrical value for status tracking and logging for determining maintenance and cleaning requirements. An address to identify each detector, type, its location within the system, and its sensitivity setting. The control panel shall provide a sensitivity readout from the detector without removal from the pluggable base.
 7. Provide self-restoring type detectors which do not require any readjustment after actuation to restore them to normal operation.
 8. All components shall be rust and corrosion resistant. Vibration shall have no effect on the detector's operation. Protect the detection chamber with a fine mesh metallic screen which prevents the entrance of insects or air born materials. The screen shall not inhibit the movement of smoke particles into the chamber.

9. The detector shall display a steady LED when in the alarm state when the system is operating from normal or standby power.
 10. Where selective localized control of electrical devices is required for interfaced equipment operation, furnish and install a base with software programmed addressable relay integral to the base.
- B. Duct Detectors: Duct smoke detectors shall meet the requirements for photoelectric light scattering type detectors. With the addition that duct detectors are UL listed for installation in air duct sampling housings for the detection of smoke in HVAC system ducts.

2.04 MANUAL PULL STATIONS

- A. Provide double action manual pull stations, where shown on the Drawings, to be flush or surface mounted as required. Manual stations shall be addressable.
- B. Stations shall be equipped with terminal strip and pressure style screw terminals for the connection of field wiring. Stations which require the replacement of any portion of the device after activation are not permitted. Stations shall be finished in fire-engine red with molded raised lettering operating instructions of contrasting color. The use of a key or wrench shall be required to reset the station.
- C. A polycarbonate tamper cover shall be provided for pull stations located in public spaces.

2.05 NOTIFICATION APPLIANCES

- A. Strobe lights:
 1. Provide with red finish plate and with the word "FIRE" horizontally printed for ceiling mounting.
 2. Xenon strobe with a minimum repetition rate of 1 Hz, not exceeding 3-Hz and a maximum duty cycle of 40 percent with a pulse duration of 0.2 seconds.
 3. Visual alarm signals shall be furnished with minimum light intensity of 75 candela and meet the requirements of ADA and UL 1971. In large rooms with ceilings over 10 feet, 110 candela models shall be provided. Any device up to 110 cd shall have adjustable candela ratings.
 4. Provide strobe light visual alarm signals which operate on 24V dc.
 5. Synchronization shall be provided as required in NFPA 72.
- B.
- C. Combination Audible and Visual Alarm:

1. Audible/visible base housing with visual alarm and front mounted **A: horn** as specified.
2. Semi-flush mounting on recessed 4-gauge square electrical box or surface mounted on backbox with adapter.
3. Audibility: In accordance with NFPA 72 and local requirements.
4. Synchronous audible/visible output.

D.

E.

2.06 SYSTEM PRINTER

- A. The system printer shall be mounted within the FACP and visible through an opening in the enclosure door. All printouts shall be automatically wound onto a take up spool. The system printer shall be an external printer with associated printer stand. Printer stand shall be capable of holding paper stock and shall provide a holding area for printouts.
- B. The printer shall continue to operate from building emergency power or fire alarm system standby batteries in the event of main power loss.
- C. The printer shall record all system events including operator commands and shall be capable of providing a printed list of system conditions such as detector sensitivities, thresholds, analog voltages, device type, and custom message. The printer shall automatically perform a self-test every 24 hours. A trouble condition shall be generated when printer paper has run out. An internal buffer shall continue to store events when paper is out.
- D. The printer shall have at least 80 characters per line and capable of printing at 120 characters per second.

2.07 REMOTE MONITORING SYSTEM:

- A. All equipment device wiring shall be provided for remote monitoring.
- B. FACP shall be compatible and or coordinated with remote monitoring station for compatibility.
- C. Communication between FACP and remote monitoring station shall be via Fiber optic network provided by others.

2.08 POWER SUPPLIES

- A. Primary power for the FACP shall be 120V ac service obtained from the emergency power panel board. Red colored breaker locks shall be provided for all fire alarm circuit breakers.

- B. Secondary power for the FACP shall be provided by sealed gelled electrolyte batteries. Batteries shall be housed in the control cabinet or a separate cabinet with adequate cell separation to prevent accidental discharge.
- C. Battery Capacity: Battery supply shall be calculated to operate its load in a supervisory mode for twenty four hours with no primary power applied, and after that time, operate its alarm mode for 5 minutes. (In addition, an alarm reserve correction of 1.3 shall be included.)
- D. Battery Charger: Secondary power battery chargers shall be obtained from the emergency power panel board. Provide battery charging circuitry for each standby battery bank in the system low voltage power supply or as a separate circuit. The charger shall be automatic in design, adjusting the charge rate to the condition of the batteries. Battery charge rate and terminal voltage shall be read using the fire alarm control panel LCD display in the service mode, indicating directly in volts and amps. Charger shall be housed in the main fire alarm control panel or the battery cabinet.

2.09 LOAD CONTROL RELAYS

- A. Relays for the control of air handler contactors shall be rated for use with circuits up to 240V ac at 7A inductive. Relays shall be of the sealed pluggable type, and terminations shall be made to pressure type screw terminals.

2.10 INTERFACE MODULES

- A. Furnish intelligent analog signaling circuit interface modules for the monitoring of contact type initiation devices, the control of electrical devices, load control relays (controlling HVAC equipment), and each independent smoke detection, and gaseous fire suppression systems. The modules shall be capable of monitoring three separate functions: alarm, trouble and supervisory conditions.
- B. The module shall be addressed, tested and programmed prior to installation using a UL listed programmer/ tester.
- C. The module shall display a steady LED for each circuit, in the normal power or standby power condition, when in the alarm state or during control circuit is activation.
- D.

PART 3 EXECUTION

3.01 PRIMARY POWER

- A. Make the service connection for the FACP at the nearest emergency or non-emergency 208/120V distribution panel where available. Provide a separate NEMA 1 "General Purpose Enclosure" for the circuit breaker if required. The circuit breaker enclosure shall be painted red, marked "FACP", and provided with a lockable handle or cover.

3.02 SYSTEM FIELD WIRING AND CONDUIT

- A. Wiring Within Cabinets and Junction Boxes: Provide wiring installed in a neat and workmanlike manner and installed parallel with or at right angles to the sides and back of any box or cabinet.
- B. Conductor Type and Size: Wire size shall be sufficient to prevent voltage drop problems. Wire type and sizing of conductors shall be in accordance with the manufacturers wiring specifications for the system, except for minimum wire size shall be as follows:
 - 1. Signaling Line Circuits: 16AWG, Type FPLR, solid copper, shielded.
 - 2. Notification Appliance Circuits: 14AWG, Type FPLR, solid copper, twisted pair, shielded.
 - 3. 120V ac Circuits: 12AWG, Type THHN, solid copper.
 - 4. Interfaced Circuits: 16AWG, Type FPLR, solid copper, shielded.
 - 5. Speaker Circuits: 16 AWG, Type FPLR, solid copper, twisted pair, unshielded.
 - 6. Firefighter Telephone Circuits: 18 AWG, solid copper, twisted pair.
 - 7. Battery Cable: 14 AWG, stranded.
- C. Connectors: All conductors shall be terminated at a screwed connector on a securely mounted approved pressure type terminal block. The use of wire nuts or similar devices shall be prohibited.
- D. Terminal Cabinets: Provide a terminal cabinet at the base of any circuit riser, on each floor at each riser, and where indicated on the Drawings. Cabinet size shall be appropriate for the size of the wiring to be connected.
- E. Conductor Numbering: All conductors installed in the system shall be numbered at every junction point. Use a numbered shrink-wrap label designed specifically for this purpose. Wire numbers shall be the same as those designated on the as-built drawings. Mark each terminal in accordance with the wiring chart and diagrams of the system.

- F. Conductor Color Coding: Color coded conductors shall be consistent for each type of circuit. When renovating or adding to an existing system, color coding shall match the existing system.
- G. Signaling Line and Notification Appliance Circuits:
 - 1. Signaling Line, notification appliance, and power circuits shall each be in separate conduit.
 - 2. Strobes are to be connected to circuits separate from speakers. This includes strobes and speakers that are mounted as a unit.
 - 3. Provisions for tying-in signaling line and notification appliance circuits directly to the FACP mother board (board containing CPU) shall not be used. Initiation and indicating circuits shall be tied to a separate electronic board before connection to the mother board.
- H. Circuit Loading:
 - 1. Spare capacity shall be in accordance with paragraph 1.07.
 - 2. Circuits operating at 24V dc shall not operate at less than 21.6 volts. Circuits operating at any other voltage shall not have a voltage drop exceeding 10 percent of nominal voltage.
- I. Wiring to a Central Monitoring location: Utilize fiber optic network to integrate fire alarm system addition to existing fire alarm monitoring office.
- J. Conduit:
 - 1. All conductors shall be in grounded metal conduit. Conduit shall be Rigid metal or EMT. Flexible metal conduit not exceeding 6 foot lengths shall be permitted from junction box to initiating device. On flexible metal conduit, use only insulated throat connectors.
 - 2. Run conduit or tubing concealed unless specifically shown otherwise on the Drawings.
 - 3. Minimum conduit size shall be 3/4 inch.
- K. Circuits to Interfaced Equipment:
 - 1. Circuits to any smoke management systems, fan shutdown systems, door locking systems, A/V shutdown, fire door release, and firefighter telephones in elevator cabs shall terminate in terminal cabinets within 914mm (3 feet) of the controllers for those systems. The completion of those circuits from the terminal cabinets to the appropriate system shall be provided under the appropriate division specification.

- L. Load Control Relays: All relays shall be supervised as required by NFPA 101 and mounted within 3 feet of the device controlled.

3.03 FIRESTOPPING

- A. Seal all holes caused by penetrating conduit, piping, or other penetrations which pass through floors, walls or ceilings. Firestop penetrations through floor slabs, fire-rated walls, shafts, or any fire-rated assembly as specified.

3.04 MARKING

- A. All metal surfaces shall be painted. Metal conduit in finished areas shall be painted the color to match adjacent surfaces. Junction boxes in unfinished areas shall be painted a full gloss enamel red. Painting shall be in accordance with Section 09 90 01, Painting and Protective Coatings.
- B. Red bands shall be applied every 10 feet (3.05m) when not using red-colored conduit.
- C. Prior to acceptance testing each fire alarm initiating device must be labeled with the device address.

3.05 DEVICE INSTALLATION

- A. FACP: Locate the FACP where indicated on the Drawings. Surface mount the enclosure with the top of the cabinet 6 feet (1829 mm) above the finished floor or center the cabinet at 5-1/2 feet (1676 mm), whichever is lower.
- B. Manual Pull Stations: Mount the manual pull stations so that their operating handles are 4 feet (1219 mm) above the finished floor.
- C. Strobes: Wall mount strobes shall be a minimum of 80 inches (2032 mm) above the finished floor or 6 inches (152 mm) below the ceiling whichever is lower.
- D. Speakers: Speakers should typically be set on the 1/2 watt tap. Speakers in areas with ceilings above 3048 mm (10 feet) shall be set on the 3/4 watt tap. Install speakers in elevator cabs.
- E. Smoke Detectors:
 - 1. In raised floor spaces, the smoke detectors shall be installed to protect 225 sq. ft (145161 sq. mm) per detector.

2. In hallways, open areas, and rooms where more than two smoke detectors are located, ionization type detectors and photoelectric type detectors shall be installed. These detectors should be arranged so that every other detector in the room is a different type than the adjacent detector. In single detector rooms install an ionization detector.
 3. Photoelectric type detectors shall be installed in elevator machine rooms and elevator hoistways.
 4. Install smoke detectors a minimum of 3 feet (914 mm) away from supply air vents.
 5. New smoke detectors shall be installed with dust covers. The dust covers shall be removed just prior to acceptance testing.
 6. The indicating LED on the smoke detector shall be visible from the floor. Where ceiling conditions prevent easy viewing of the LED from the floor, a remote indicating lamp must be installed.
- F. Graphic Annunciator: Surface mount the panel, with the top of the panel 6 feet (1800 mm) above the finished floor or center the panel at 5-1/2 feet (1600 mm), whichever is lower.

3.06 TESTS

- A. Megger Tests: After all wiring has been installed, and prior to making any connections to panels or devices, all wiring shall be megger tested for insulation resistance, grounds, and/or shorts. Conductors with 300 volt rated insulation shall be tested at a minimum of 250V dc. Conductors with 600 volt rated insulation shall be tested at a minimum of 500V dc. The tests shall be witnessed by OSHEM and the Owner and test results recorded for use at the final acceptance test.
- B. Loop Resistance Tests: Measure and record the resistance of each circuit with each pair of conductors in the circuit short-circuited at the farthest point from the circuit origin. The tests shall be witnessed by the Owner and OSHEM and test results recorded for use at the final acceptance test.
- C. Preliminary Testing: Conduct preliminary tests to ensure that all devices and circuits are functioning properly. After preliminary testing is complete, provide a letter certifying that the installation is complete and fully operable. The letter shall state that each initiating and indicating device was tested in place and functioned properly. The letter shall also state that all panel functions were tested and operated properly. The Contractor and an authorized representative from each supplier of equipment shall be in attendance at the preliminary testing to make necessary adjustments.

- D. Final Acceptance Test: Notify the Owner in writing when the system is ready for final acceptance testing. Submit request for test at least 14 calendar days prior to the test date. A final acceptance test will not be scheduled until meggar test results, the loop resistance test results, and the submittals required in Part 1 are provided to the Owner. Test the system in accordance with the procedures outlined in NFPA 72. The required tests are as follows:
1. Verify the absence of unwanted voltages between circuit conductors and ground.
 2. Verify that the control unit is in the normal condition as detailed in the manufacturer's operating and maintenance manual.
 3. Complete operational tests under emergency generator power.
 4. Complete operational tests under battery power and as described above under battery power. Test the battery charger.
 5. Test each initiating and indicating device and circuit for proper operation and response. Disconnect the confirmation feature for smoke detectors during tests to minimize the amount of smoke or test gas needed to activate the detector.
 6. Test the system for all specified functions in accordance with the Contract Drawings and Specifications and the manufacturer's operating and maintenance manual.
 7. Visually inspect all wiring.
 8. Verify that all software control and data files have been entered or programmed into the FACP.
 9. Verify that Shop Drawings reflecting as-built conditions are accurate.
 10. Measure the current in circuits to assure that there is the calculated spare capacity for the circuits.
 11. Measure voltage readings for circuits to assure that voltage drop is not excessive.
 12. Measure the voltage drop at the most remote appliance on each notification appliance circuit.
- E. Test Equipment: The contractor shall supply personnel, communication devices, and all equipment necessary for performance of the final test.

3.07 TRAINING

- A. Instructor: Include in the project the services of an instructor, who shall have received specific training from the manufacturer for the training of other persons regarding the inspection, testing, and maintenance of the system provided. The instructor shall train the employees designated by the Owner, in the care, adjustment, maintenance, and operation of the fire alarm system.
- B. Training sessions shall cover all aspects of system performance, including system architecture, signaling line circuit configurations, sensor and other

initiating device types, locations, and addresses, fire alarm control panel function key operation, and other functions as designated by the Engineer.

- C. Required Instruction Time: Provide 16 hours of instruction after final acceptance of the system. The instruction shall be given during regular working hours on such dates and times as are selected by the Owner. The instruction may be divided into two or more periods at the discretion of the Owner. One training session shall be videotaped by the Contractor. Videotapes shall be delivered to the Engineer.
- D. Provide a typeset printed or typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame. Install the frame in a conspicuous location observable from the FACP. The card shall show those steps to be taken by an operator when a signal is received as well as the functional operation of the system under all conditions, normal, alarm, supervisory and trouble. The instructions shall be approved by the Engineer.
- E. Comprehensive system troubleshooting training shall be provided for a single individual designated by the Engineer. This session shall be separate and distinct from the above described sessions.
- F. All training sessions shall be conducted following final system certification and acceptance. Three additional training sessions shall be provided for all security personnel on all shifts six months after final system certification.
- G. All training sessions shall be conducted by an authorized fire alarm system distributor representative, who has received specific training from the manufacturer for the training of other persons regarding the inspection, testing, and maintenance of the system provided.

3.08 KEYS

- A. Keys and locks for all equipment shall be identical where possible. Provide not less than six keys of each type required. Identify keys by an appropriate number stamped on each key or on a metal tag attached thereto. Provide a key numbering chart in each operation and maintenance manual furnished.

END OF SECTION

ATTACHMENT L

CONTRACT

THIS CONTRACT FOR SALE OF EQUIPMENT AND SERVICES ("Contract") is entered into as of the ____ day of _____, _____, Effective Date, by and between _____, having a principal place of business at _____ (the "Supplier"); and the Sewerage & Water Board of New Orleans, with principal offices at 625 St Joseph St, New Orleans, LA 70165 (the "Owner"). Owner and Supplier are referred to herein, individually, as a "Party" and, collectively, as the "Parties."

RECITALS

WHEREAS, Supplier is engaged in the business of manufacturing and managing an inventory of various kinds of cable ; and

WHEREAS, Owner desires to purchase, and Supplier desires to sell the Equipment, together with inventory management services in connection with Owner's Project located in New Orleans, Louisiana where the Equipment will be installed by Others , subject to the terms set forth herein;

NOW, THEREFORE, in consideration of the mutual promises stated herein, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

ARTICLE 1 - Definitions.

A. Definitions. As used in this Contract, the following terms have the meanings indicated:

"Affiliate" shall mean any entity that directly or indirectly controls, is controlled by or is under common control with a Party. For the purposes of this definition, "control" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of the controlled entity, whether through the ownership of voting securities or partnership or other ownership interests or by Contract or otherwise.

"Bidder" shall mean one who submits a bid for a Contract with the Owner for the work described in the proposed Contract Documents.

"Change in Law" shall mean a new Law or change to an existing Law, or a change in the interpretation or application of a Law by the cognizant executive or judicial authorities occurring after the Effective Date of Supplier's contract to Owner.

"Change Order" shall mean a mutually agreeable written agreement to change the Equipment, Services, or any provision of this Contract, which describes the change, identifies the agreement as a Change Order sets out adjustments, if any, in the Contract Price and any other provision of this Contract which is affected, and is signed by the Parties.

"Codes and Standards" shall have the meaning ascribed in Article 19 of this Contract. "Confidential Information" shall have the meaning ascribed in Article 34 of this Contract. "Contractor" shall mean the person, firm, partnership, or corporation with whom Owner has entered a contract to install the Equipment to be procured via this Contract.

"Contract Currency" shall mean the currency in which the Contract Price is stated in United States Dollars USD.

"Contract Documents" shall have the meaning ascribed in Article 39 of this Contract.

"Contract Price" shall mean the total price as consideration for the Equipment and the Services, as set forth in Article 3 of this Contract, and as may be adjusted from time to time in accordance with this Contract.

"Day" or "Days" shall mean a calendar day, including Saturdays, Sundays, and holidays, except that in the event that an obligation is due for performance on a Saturday, Sunday or US national legal holiday, the obligation shall be deemed due on the next business day thereafter.

"Document Submittals" shall mean the documents to be submitted by Supplier after Notice to Proceed and governed by Contract, which references sections of the Technical Specification Package for direction regarding submittals and submittal procedures.

"Effective Date" shall mean the date described in Article 42 of this Contract.

"Equipment" shall refer to the materials or goods to be provided and specified in the Technical Specifications.

"Governing Law" shall have the meaning ascribed in Article 41 of this Contract.

"Indemnified Party" shall have the meaning ascribed in Article 28 of this Contract.

"Indemnifying Party" shall have the meaning ascribed in Article 28 of this Contract.

"Key Personnel" shall be Supplier's Project Manager, the Site Manager, and the selected individuals rendering Technical Advisory Services.

"Kickoff Meeting" shall mean a project kick off meeting between Supplier's project execution team and Owner's project team.

"Law" or "Laws" shall mean those laws, regulations, decrees or similar orders with mandatory effect issued by the legislative, judicial or executive branch of any relevant government, in effect as of the date of Supplier's contract to Owner, to the extent such laws, regulations, decrees or similar orders are applicable to the scope of this Contract.

"Local Laws" shall have the meaning ascribed in Article 19 of this Contract.

"National Laws" shall have the meaning ascribed in Article 19 of this Contract.

"Notice" shall have the meaning of any formal written announcement, notification or other communication required under this Contract. A Notice shall be deemed served if sent by certified mail to the address designated in this Contract.

"Owner" shall mean Sewerage & Water Board of New Orleans ("SWBNO"), the entity that is Contract, and any of its Affiliates or subsidiaries, and which owns the Facility in which the Equipment will be installed.

"Owner Representative" or "OR" shall mean Jacobs Engineering Group. ("JEG") or any of its affiliates or subsidiaries, acting on behalf of the Sewerage & Water Board of New Orleans ("SWBNO").

"Party" and "Parties" shall have the meanings ascribed in the foreword to this Contract.

"Payment Schedule" shall mean the schedule of payments described in Article 6 of this Contract.

"Project" shall mean Owner's project for which Supplier is supplying Equipment and/or Services as described in this Contract.

"Scope of Supply" shall mean the Equipment plus the Services, as set forth in the Technical Specifications.

"Services" shall mean those services described in Article 3(B).

"Site" shall mean the location of the Project and place where the Equipment will be installed:

*Sewerage & Water Board of New Orleans
Carrollton Water Plant West Power Complex
8800 S Claiborne Ave
New Orleans, LA 70118*

"Subcontractor(s)" shall mean any corporation, partnership, or individual having a contract with Supplier to supply material, equipment, labor, goods, or services to Supplier for inclusion in the Equipment or Services provided by Supplier under this Contract.

"Substantial Completion" shall mean that all the following conditions have been satisfied:

1. Supplier shall have completed the performance of the Work according to all of the provisions of this Contract to the extent necessary;
2. the Work shall have been completed in accordance with the terms of this Contract (except for minor deviations that in no way affect the safe, efficient and full use of the equipment)
3. Supplier shall have completed all of Supplier's items on the Substantial Completion punch list that in Supplier's reasonable judgment in accordance with prudent industry practices could prevent the safe, normal, and continuous operation of the Work; and
4. Supplier shall provide Owner written notice certifying the date upon which all the preceding conditions (1-3 above) have been satisfied.

Upon the satisfaction of all the above conditions, Substantial Completion will have occurred, and Owner shall accept the Work. If Owner believes any condition to Substantial Completion has not been satisfied, Owner shall notify Supplier thereof in writing within ten (10) business days after delivery of written notice, noted in 4. above. If Owner fails to so notify Supplier within this ten (10) business day period, then Substantial Completion shall be deemed to have occurred on the date stated in Suppliers notice.

"Supplier" shall mean any person, manufacturer, vendor, seller, firm, partnership, or corporation with whom Owner has entered this Contract.

"Supplier Taxes" shall mean corporate and individual taxes that are measured by net income or profit imposed by any governmental authority of any country on Supplier, its employees, subcontractors or contractors due to the execution of any agreement or the performance of or payment for Work hereunder, except for withholding tax for income on payments to Supplier.

"Technical Advisory Services" shall have the meaning ascribed in the Technical Specifications.

"Unit Price" shall mean the amount bid on a per "day," per "hour," per "trip" basis as noted on the Unit Price Material Bid Form. The "Unit Price" as bid shall not change for the term of the Contract.

"Warranty Period" shall have the meaning ascribed in Article 17 of this Contract.

"Work" shall mean the procurement, fabrication, and supply of the Equipment and the performance of the Services, and any corrective actions undertaken pursuant to Article 17.

B. Rules of Interpretation. The following rules of interpretation shall apply in construction of this Contract. Unless otherwise required by the context in which any term appears: (i) capitalized terms used in this Contract have the meanings specified in this Article, or as otherwise defined in this Contract, (ii) the singular shall include the plural, (iii) the words "herein," "hereof" and "hereunder" shall refer to this Contract as a whole and not to any particular section or subsection of this Contract, (iv) references to this Contract shall include a reference to all attachments, appendices, annexes, schedules and exhibits hereto, as the same may be amended, modified, supplemented or replaced from time to time, (v) the words "include," "includes" and "including" are not limiting, (vi) any consent to be given by either Party hereunder shall not be unreasonably withheld, delayed or conditioned, except as explicitly stated to the contrary herein, and (vii) references to any agreement, document or instrument shall mean a reference to such agreement, document or instrument as the same may be amended, modified, supplemented or replaced from time to time.

ARTICLE 2 - Scope of Supply

The Supplier shall manufacture and manage the Equipment and perform the Services as more fully described in the Technical Specifications, subject to the terms and conditions set forth in this Contract.

ARTICLE 3 - Price

Owner shall pay to Supplier the following "Contract Price" in consideration of the Equipment and Services.

A. Taxes. The Contract Price is stated exclusive of state and local sales taxes. Sewerage & Water Board of New Orleans is exempt by statute from any sales tax, both state and local. The Contract Price is complete compensation for the provision of all Equipment and Services and includes all transportation and shipping costs imposed with respect to the provision of any Equipment or Services. Supplier shall be responsible for all present and future taxes, tariffs, VAT, duties, fees, deductions, withholdings, or other charges and liabilities (all together, "Taxes") imposed by any authorities outside of the State of Louisiana.

B. Services. The Contract Price includes all services, supervision, insurance, consumables, expendables, warranty and other contractual obligations, supplies, equipment, testing, inspection, to design, and fabricate the Equipment included in the Supplier's Scope of Supply attached hereto.

C. Price Adjustments. The Contract Price may be adjusted as necessary to take account of (a) Change Orders, or (b) other adjustments specifically provided for in this Contract.

D. Payment. Payment of Contract Price shall be made in accordance with the Payment Schedule set forth and the payment terms set forth in Article 6. In the case of Change Orders, payment shall be made in accordance with those terms stated in the Change Order.

E. Equipment/Service Description. Supplier will provide one total Contract Price to cover all items included in Scope of Supply.

ARTICLE 4 – Act 318 of 1958

Under the terms of Act 318 of 1958, of the Regular Session of the Legislature of the State of Louisiana, all things being equal, preference must be given to either (1) firms doing business in the State of Louisiana or (2) to products produced, grown, or manufactured in the State.

Before any bill for supplies shall be paid to any non-resident firm, a statement in writing shall be submitted by the seller to the effect that his firm has paid all taxes duly assessed by the State of Louisiana and its political subdivisions including franchise taxes, privilege taxes, sales taxes and all other taxes for which it is liable to the State and its political subdivisions.

ARTICLE 5 – Independent Vendor Status

The Vendor is an independent Vendor and will not be deemed an employee, servant, agent, partner, or joint venture of the Board and will not hold itself or any of its employees, subcontractors, or agents to be an employee, partner, or agent of the Board.

ARTICLE 6 - Payments

A. Payment Milestones. In accordance with the Milestone Payment Schedule, for those payments tied to milestones, invoices shall only be issued upon completion of the milestone and submission by Supplier of the required documentation per this Article, Supplier's Submittal Schedule, and payment shall be due and payable net forty-five (45) Days from the date the Owner receives from the Owner Representative an approved and certified Supplier's invoice.

B. Invoices. The original and two (2) copies of an invoice referencing this Contract Number shall be sent by electronic mail and in PDF format to the Owner Representative, with a courtesy copy to Owner.

C. Effect of Changes in Contract Price. If any adjustment results in an increase to the Contract Price, Owner shall pay for the increase in accordance with the corresponding invoice submitted by Supplier. If any adjustment results in a decrease in the Contract Price, payments previously made shall be retained by Supplier and will be applied to subsequent payments as they become due.

D. Field Modifications. In the event Owner notes non-conformity in the Equipment as compared to Supplier provided Submittal and specifications, Owner shall send notice of such non-conformity to Supplier as soon as reasonably practicable. Supplier shall review Owner's claim of nonconformity, and if Supplier agrees with the claim on non-conformity, then within five (5) Days of Supplier's receipt of Owner's notice, Supplier shall commence and continue to cure or remedy the nonconformity.

ARTICLE 7 - Bonds and Statements of Claims

A. Bonds. Supplier shall provide a payment bond and performance bond with a good, solvent, and sufficient surety in a sum no less than the total of the contract price for each bond. All aspects of bonds and statements of claims made applicable to this Contract shall be governed by Louisiana law. Notwithstanding the above, aggregate recovery of the payment bond and the performance bond shall not exceed the total amount of the Contract Price.

B. Requirements. The payment and performance bonds shall be statutory bonds and no modification, omissions, additions, in or to the terms of the contract, in the plans or specifications or in the manner and mode of payment diminish, enlarge, or otherwise modify the obligations of the bonds. The bonds shall be executed by the Supplier with surety or sureties approved by Sewerage & Water Board of New Orleans and shall be recorded with the contract in the office of the recorder of mortgages in the parish where the work is to be done not later than thirty (30) days after the work has begun.

Any surety bond written shall be written by a surety or insurance company currently on the U.S. Department of the Treasury Financial Management Service list of approved bonding companies which is published annually in the Federal Register. In addition, any surety bond written shall be written by a surety or insurance company that is currently licensed to do business in the State of Louisiana.

C. Inspection. Upon request of any person or entity appearing to be a potential claimant requiring payment for work done arising under this Contract, the Supplier shall promptly furnish a copy of the bonds or shall permit a copy to be made.

ARTICLE 8 – Non-Discrimination

In the performance of this Contract, the Vendor will not discriminate on the basis, whether in fact or perception, of a person's race, color, creed, religion, national origin, ancestry, age, sex (gender), sexual orientation, gender identity, domestic partner status, marital status, physical or mental disability, or AIDS – or HIV status against (1) any employee of the Board working with the Vendor in any of Vendor's operations within Orleans Parish or (2) any person seeking accommodations, advantages, facilities, privileges, services or membership in all business, social, or other establishments or organizations operated by the Vendor. The Vendor agrees to comply with and abide by all applicable federal, state,

and local laws relating to non-discrimination, including, without limitation, Title VII of the Civil Rights Act of 1964, Section V of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990.

In all hiring or employment made possible by, or resulting from this Agreement, there (1) will not be any discrimination against any employee or applicant for employment because of race, color, religion, gender, age, physical or mental disability, national origin, sexual orientation, creed, culture, or ancestry, and (2) where applicable, affirmative action will be taken to ensure the Vendor's employees are treated during employment without regard to their race, color, religion, gender, age, physical or mental disability, national origin, sexual orientation, creed, culture, or ancestry.

This requirement shall apply to, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship. All solicitations or advertisements for employees shall state that all qualified applicants will receive consideration for employment without regard to race, orientation, creed, culture, or ancestry. The Vendor will require all sub-contractors to comply with the requirements of this article.

ARTICLE 9 - Correspondence

A. Contract Interpretation. Supplier shall submit all questions and requests for interpretation of the Contract documents prepared by Owner in writing to the Owner Representative (OR).

B. Notices. All notices required in writing under this Agreement will be considered as having been given by one Party to the other upon the latter Party's receipt of same. All notices will be transmitted by registered or certified mail, by overnight courier or facsimile with written confirmation.

C. Project Correspondence. Supplier shall serially number all correspondence issued under this Contract. Except as indicated elsewhere in this Contract or the attachments thereto, or as otherwise directed in writing by Owner, all correspondence to Owner shall reference the Contract number and shall be addressed in accordance with Article 9(B). The Owner Representative and Program Manager shall be copied on all project correspondence. These individuals may be identified in writing to the Supplier.

ARTICLE 10 - Key Personnel

A. Qualifications of Personnel. Supplier agrees to provide the services and work of competent and experienced personnel with backgrounds in providing similar services and work, and who are fluent in written English and verbal English.

ARTICLE 11 - Title Transfer, Delivery, Risk of Loss

A. Transfer. Ownership of Equipment shall transfer to SWBNO's Contractor for installation at the Site. Estimated Dates for Equipment Transfer are specified in Attachment L: Technical Specifications.

B. Liquidated Damages. If any Equipment is not ready to be Transferred on or before Transfer Date for reasons attributable to Supplier and not excused elsewhere in this Contract, Supplier shall pay as liquidated damages, and not as a penalty, a sum of \$1,000.00 per day. The liquidated damages for delay in Delivery shall be the Owner's exclusive remedy for, and the Supplier's sole obligations arising out of delay.

C. Risk of Loss. With respect to each item of Equipment, Risk of Loss, the parties specifically agree that, regardless of passage of title, the risk of loss to any of the Work and to any goods, materials, Equipment and furnishings, provided or to be provided under the Contract, shall remain with Supplier until Date of Transfer to Contractor. Should any of the Work and/or goods, materials, Equipment, and furnishings be destroyed, mutilated, defaced, or otherwise damaged before Transfer, the Supplier shall repair or replace them at no additional costs to the Owner. Any performance bond or insurance protection required by this Contract or otherwise provided by the Owner or Supplier shall in no way limit the responsibility of the Supplier under this Section.

ARTICLE 12 – Worker's Compensation

Vendor herein expressly agrees and acknowledges that it is an "independent contractor" as defined in LSA-R.S. 23:1021 (6), that its employees shall not be considered employees of the Board for workers compensation coverage and that the Board shall not be liable to the Vendor or its employees for any workers compensation benefits or coverage.

ARTICLE 13 - EXCLUSION OF UNEMPLOYMENT COMPENSATION COVERAGE

Vendor herein expressly agrees and acknowledges that it is an "independent contractor" as defined in LSA-R.S. 23:1472 (E), that neither the vendor nor anyone employed by the vendor shall be considered an employee or the Board for the purpose of unemployment compensation coverage.

ARTICLE 14 - Reserved

ARTICLE 15 - Reserved

ARTICLE 16 - Observation, Inspection and Factory Testing

A. Observation at the Site. Supplier shall be afforded access during normal business hours to observe the work in progress at the Site.

B. Inspections, Tests, and Progress Evaluations at Supplier's Facilities. Owner shall be afforded access to Supplier's facilities provided reasonable written notice is given by Owner. Owner's inspector shall be provided access to Supplier's facilities during normal business hours to obtain information on production progress and make inspections. Owner shall have complete access to those areas concerned with Equipment; however, such access shall not include restricted areas where Work of a proprietary nature is being conducted. It is understood that no additional testing, other than required by the Contract, shall be required of Supplier, unless requested through a Change Order. Supplier shall not be required to delay manufacturing or other activities to accommodate Owner's inspection.

C. Inspections and Tests at Suppliers' Facilities. Subject to the conditions set forth in the foregoing paragraph, Supplier will make reasonable efforts to allow for Owner's access to its Suppliers' facilities for the purposes described in the paragraph above.

D. Inspection Not Acceptance. Owner's inspection of the Equipment or its failure to inspect does not relieve Supplier of its obligation to fulfill the requirements of this Contract, nor is it to be construed as acceptance by Owner.

ARTICLE 17 - Warranty

A. Warranty Period. Supplier shall also warrant the Equipment and the associated Services on the terms set forth in this Article: twelve (12) months following the Final Acceptance by the Sewerage and Water Board of New Orleans.

B. Warranty. Supplier warrants to Owner that during the Warranty Period, the Equipment to be delivered hereunder shall be:

- (1) free from defects in design, material, workmanship, and title; and
- (2) the Services shall be performed in a competent, diligent manner; and
- (3) in compliance with 42 U.S.C. § 7541.

C. Remedy. Supplier, at its sole cost, shall promptly repair or, at Owner's discretion, replace any part or component of the Equipment which appears defective during the Warranty Period as a result of faulty design, materials, and/or workmanship; provided, when required by Supplier, that such part or parts replaced be returned to Supplier, at Supplier's cost, to the place instructed by Supplier. Owner shall take appropriate steps to prevent any defect from becoming more serious and to enable Supplier to rectify the aforesaid defect. Any warranty claims or requests with respect to Supplier's warranty must be made in writing as provided for in Notice provision during the Warranty Period.

Replaced parts shall become Supplier's property. Supplier shall bear all costs of repairing or replacing the defective parts originally supplied by Supplier, as well as the shipping costs of the defective parts

and of the repaired or replacement parts between the Facility and the place of repair or replacement as instructed by Supplier.

ARTICLE 18 - Reserved

ARTICLE 19 - Reserved

ARTICLE 20 - Hazardous Materials

For each chemical substance that Supplier brings onto Owner Site, Supplier shall furnish: all appropriate shipping certification; labeling in compliance with the Workplace Hazardous Materials Information System; and Material Safety Data Sheets in compliance with the Workplace Hazardous Materials Information System.

If, at the Site, Supplier encounters toxic substances, hazardous substances or hazardous wastes, (as such terms may be defined in any statute or ordinance or regulations promulgated by any federal, state or local governmental authority of the United States or the country of the Site) (collectively, the "Hazardous Materials") not brought onto the Site by Supplier, which require special handling and/or disposal, Supplier shall immediately notify Owner and not further exacerbate the existing conditions, and Owner shall immediately take measures required by federal and state laws and regulations to eliminate such hazardous conditions so that the work under the Contract may safely proceed. If any such Hazardous Materials cause an increase in Supplier's cost of or the time required for performance of any part of the work, an equitable adjustment shall be made in the price and schedule. Owner agrees to properly dispose of all Hazardous Materials produced or generated in the course of Supplier's work at the Site. Owner shall indemnify Supplier for any and all claims, damages, losses, causes of action, demands, judgments, and expenses arising out of or relating to (i) the presence of any Hazardous Materials which are present on the Site prior to the commencement of Supplier's work, (ii) improperly handled or disposed of by Owner, or (iii) brought on to the Site or produced thereon by parties other than Supplier.

ARTICLE 21 - Environmental, Safety, and Health Regulations (ES&H)

While on the premises of Owner, Supplier and its employees shall comply with all applicable environmental, safety and health laws, regulations, and ordinances and with the safety, health and plant regulations of Supplier and Owner, and shall ensure that all of its employees and agents have a safe place of work on said premises. Supplier shall keep said premises and the vicinity thereof clean of debris and rubbish caused by its work and, upon completion of its work, shall leave the premises clean and ready for use. Upon request of Owner, and at no cost or expense to Owner, Supplier shall promptly remove from said premises any person under the control of Supplier who violates any of the aforesaid

environmental, safety and health laws, regulations, ordinances or plant regulations or who may justifiably cause or threaten to cause a breach of the peace.

ARTICLE 22 - Safety

Supplier shall proceed with the Work in a manner dictated by all applicable federal and state safety regulations, Owner Safety Manual, and safe practice, using materials, tools, and rigging of a safe character. Supplier shall strictly comply with these laws, rules, and regulations including, but not limited to, OSHA requirements, and shall provide documented evidence of that compliance upon the Designated Representative's request. Supplier shall provide and use all protective devices to permit safe working conditions for Supplier's employees and to prevent hazards to employees of other suppliers, Owner and its employees, or the public. While on Owner's property, Supplier's personnel shall wear appropriate personal protection equipment. If, in Owner's opinion, Supplier is not proceeding with its Work in a safe manner or in accordance with federal, state, or Owner safety regulations, Owner may issue a Safety Violation Notice or otherwise stop the Work and direct Supplier to rectify the unsafe conditions immediately. If Supplier fails to promptly rectify the situation, and it is within his scope of supply to control, Owner may proceed to rectify the unsafe conditions at Supplier's reasonable expense. Compliance with this paragraph shall affect neither the Contract Price nor the schedule. Supplier shall comply with all Owner's and OSHA confined space requirements and procedures, including Owner's permitting requirements.

Owner will take all necessary precautions, at all times, for the safety of Supplier's personnel at Site. This includes, but is not limited to, instruction of Owner's safety practices, proper and safe handling of hazardous substances and protection of Supplier's personnel from exposure thereto, energization and de-energization of all power systems (electrical, mechanical and hydraulic) using a safe and effective lockout tagout procedure, and conducting daily safety meetings during construction and startup.

Supplier may, from time to time, conduct safety audits to ensure safe conditions exist and make recommendations to Owner concerning same. Neither the conduct or non-conduct of safety audits nor the making of any recommendation by Supplier shall relieve Owner of the responsibility to provide a safe place to work. If Supplier's personnel require medical attention, local Owner facilities will be made available to Supplier's personnel for the duration of such needs.

If, in Supplier's opinion, the safe execution of Services at the Site is, or is apt to be, imperiled by local conditions, Supplier may remove some or all of its personnel from the Site, and/or supervise performances of all or any part of its Services, and/or evacuate its personnel with assistance from Owner as necessary for said evacuation, any of which shall be an Excusable Delay.

Supplier will comply with health and safety applicable standards. To the extent a health and safety issue is identified, Supplier will promptly make all reasonable efforts to correct any safety conditions. If Owner or Supplier issues an order stopping all or part of the work due to a Safety issue that is not attributable to Supplier, this shall be treated as Owner delay and Supplier shall be entitled to a Change Order.

ARTICLE 23 - Plant Protection and Security

If the Work requires Supplier's employees to enter a protected or policed area of the Site, including all utility operating areas, Supplier shall arrange, in conjunction with Owner's security, for visible identification badges for all Supplier's personnel employed on such Work. Supplier's trucks or common carriers entering the Site are subject to inspection.

Supplier, its employees, and its subcontractors or material providers, shall observe traffic rules, speed regulations, or other safety rules in the operation of its vehicles and equipment on the Site, as established by Owner. Supplier's employees shall comply with all other applicable conduct policies of Owner while on the Site.

ARTICLE 24 - Project Management

A. Customer Kickoff Meeting. Supplier shall hold a Customer Kickoff Meeting within Thirty (30) days of the Effective Date.

B. Supplier Project Manager. No later than the execution date of the Contract, Supplier will appoint an individual person as its Project Manager and will authorize that person to act on its behalf in matters connected with this Contract or the Project.

C. Global Sourcing. Supplier reserves the right in its discretion to obtain, source, subcontract, manufacture, fabricate and assemble the Equipment and any of its components and systems from nondomestic concerns; it being understood that the quality standards and warranties of Supplier under this Contract shall be adhered to in all cases irrespective of source. Supplier shall be responsible for those costs associated with its global sourcing and manufacturing activities that occur prior to title transfer to Owner. Owner shall not be required to incur any additional liability under this Contract due to Supplier's global sourcing.

D. Electronic Communication. The Parties agree to use Owner's or Owner Representative's Document Management System as the medium for the storage and transmittal of drawings, specifications, and project reports.

ARTICLE 25 - Changes

A. Changes Resulting from Changes in Codes and Changes in Law. If, after the effective date of this Contract, any change to the Codes and Standards, Ambient Site Conditions, Site Requirements or a specific Change in Law that requires a change to the Equipment, Supplier shall be entitled to a Change Order that includes equitable adjustments to the Contract Price and to the Scheduled Major Component Delivery Date(s) and other provisions of this Contract that are impacted. If Supplier is entitled to a Change Order pursuant to the provisions of this paragraph, Supplier shall submit to Owner a draft Change Order which will be subject to Owner's approval.

B. Owner Initiated Changes. Owner shall have the right to request that Supplier consider changes to the Equipment or the Services, including modifications, alterations, or additions. If Owner wishes to request such a change, Owner shall notify Supplier in writing. Within fifteen (15) Days after receipt of such notice (unless otherwise extended by mutual agreement), Supplier shall advise Owner of the feasibility of the requested change, and shall submit to Owner a draft Change Order, unless the matter requires further investigation and research in which case Supplier will provide an estimate of the time frame in which Supplier will be able to submit a detailed response to Owner.

C. Supplier Initiated Changes. If Supplier wishes to propose a change, or if Supplier is entitled to at Change Order pursuant to the provisions of this Contract, Supplier shall submit to Owner a draft Change Order.

D. Contents of Draft Change Order. The draft Change Order shall include:

- (1) a technical description of the proposed change in such detail as Owner may reasonably require,
- (2) a lump sum firm price adjustment (increase or decrease) in the Contract Price, if any, caused by the proposed change,
- (3) all potential effect(s), if any, on the Scheduled Major Component Delivery Date(s), or any other schedule or date for performance by Supplier hereunder caused by the proposed change, and
- (4) all potential effect(s), if any, on Supplier's ability to comply with any of its obligations hereunder, including Supplier's warranties and Performance Guarantees caused by the proposed change.

E. Process for Concluding Change Order. Owner shall, within ten (10) Days from the date of receipt of such information, either approve or disapprove the draft Change Order in writing or request additional time to consider the draft Change Order. If Owner approves the Change Order, Owner and Supplier shall then sign the Change Order that shall operate as an amendment to this Contract. If Owner has not approved or disapproved the draft Change Order within ten (10) Days, Supplier shall have the right to reissue the Change Order for Owner review.

F. Agreement Required. Except for Change Orders to which Supplier is expressly entitled pursuant to Article 25 B., all changes under this Contract shall be subject to mutual agreement, and no Change Order will be effective until signed by both Parties.

ARTICLE 26 - Excusable Delays

A. Excusable Delays. Supplier shall not have any liability or be considered to be in breach or default of its obligations under this Contract to the extent that performance of such obligations is delayed or prevented, due to, but not limited to, the following ("Excusable Delay"):

- (1) Acts of God, fires, severe weather conditions, earthquakes, strikes or other labor disturbances, floods, war (declared or undeclared), terrorism, epidemics, civil unrest, riots; or

(2) delays in the prerequisite work of Owner, Owner's other contractors or suppliers, or other acts (or omissions) of Owner.

Supplier shall notify Owner of any such delay. Supplier shall be entitled, after consultation with Owner, to an adjustment to the Contract Price, provided, however, that Supplier provides Owner with all reasonable substantiating documentation of any additional costs and expenses derived from an Excusable Delay and Supplier takes all reasonable actions necessary to mitigate or avoid such additional costs and expenses. The Scheduled Major Component Delivery Date(s) or date of performance shall be extended for a reasonable period necessary to overcome the effect of such Excusable Delay. Changes to the Scheduled Major Component Delivery date shall be executed through a mutually agreeable Change Order. Any dispute as to the quantum of an adjustment to the Contract Price shall be subject to resolution through Article 40 of this Contract.

B. Termination for Extended Delay. If any Excusable Delay extends for more than one hundred eighty (180) Days and the Parties have not agreed upon a revised basis for continuing the Work at the end of the Excusable Delay, including adjustment of the Contract Price, then either Party (except where Excusable Delay is caused by Owner, in which event only Supplier), upon thirty (30) Days written notice, may terminate this Contract with respect to the portion of Equipment to which title has not yet passed, whereupon Owner shall promptly pay Supplier termination charges as set forth in the Termination Schedule.

C. Notice of Labor Disputes. Whenever Supplier has knowledge that any actual or potential labor dispute may delay or threatens to delay the timely performance of this Contract, Supplier shall immediately give Owner written notice thereof and progress made in settlement of such dispute.

ARTICLE 27 – Reserved

ARTICLE 28 - General Indemnity

A. General Indemnity. To the fullest extent permitted by law, the Supplier will indemnify, defend, and hold the Board, its officials, employees, and agents (the "Indemnified Parties") harmless from and against bodily injury to third parties (including employees claims that are specifically not covered by workers compensation) or damage to tangible third party property, and, at its expense, shall defend against and hold the Indemnified Party harmless from any such claims raised by a third party arising in connection with this Contract. Notwithstanding the foregoing, for third party claims made against Owner, this provision does not waive the defense of governmental immunity otherwise available.

B. "Third Parties" Defined. "Third parties" under this Article do not include the Parties, the owner of the Site, their affiliates, agents, successors or assigns, any operation or maintenance supplier of the Parties or the owner of the Site, or any entity:

(1) with an equity or security interest in any Party or the owner of the Site, or their assets or property,

(2) that seeks to claim any rights, power, or privileges of one of the Parties or the owner of the Site, or

(3) that seeks to claim as a third-party beneficiary of this Contract or one of the Parties or the owner of the Site.

ARTICLE 29 - Insurance

Except as otherwise noted, at all times during this Agreement or the performance of work required by this Agreement, the Supplier will maintain the following insurance in full force and effect for the duration of the work under this Agreement:

Minimum Requirements:

Supplier shall maintain at its own expense, and in good standing, such insurance as will protect the SWBNO, the City of New Orleans, their officers, officials, employees, boards, commissions, and volunteers, and the Supplier itself, from and against any and all claims or damages to public or private property or personal injury, including death, to employees or the public, which may arise from any operations under this contract or any of its subcontracts. The coverage shall contain no special limitations on the scope of protection afforded to the SWBNO or the City. Both the SWBNO and the City shall appear as "Additional Insured" on all Commercial General Liability and Business Automobile Insurance. Any failure to comply with reporting provisions of the policy shall not affect coverage provided to the SWBNO and the City, their officers, officials, employees, boards and commissions, and volunteers. The Supplier's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

If this transaction requires the Supplier or subcontractor's employees to enter SWBNO's facilities or job sites, a senior employee of the Supplier and/or any subcontractor will review the SWBNO's Safety Orientation Notice (Notice) and will explain this Notice to every employee who will enter SWBNO facilities. This Notice is included as a part of the specifications for this contract.

Supplier and its insurers shall agree to waive all rights of subrogation, except on their Professional Liability Policy, against the SWBNO, the City, and their officers, officials, employees, boards and commissions, and volunteers for losses arising from work performed by the Supplier for SWBNO and the City. Each insurance policy required by this contract shall be endorsed to state that coverage shall not be suspended, voided or canceled by either party, or reduced in coverage or in limits except after thirty (30) days prior written notice by certified mail, return receipt requested, that has been given to the Risk Manager of SWBNO. In general, insurance is to be placed with insurers with a Best's rating of at least A-, although this requirement may be reviewed and modified by the Risk Manager of SWBNO in the best interest of SWBNO. The Risk Manager may also consider performing such review upon written request from Supplier. Supplier shall furnish SWBNO and the City with certificates of insurance affecting coverage required by this contract. The certificates for each insurance policy are to be signed by a person authorized by that insurer to bind coverage on its behalf.

The certificates of insurance are to be received and approved by the Risk Managers of SWBNO and the City before work commences. In the event of a claim, Supplier shall make applicable insurance policies

available for review by SWBNO and the City. Supplier shall retain its rights to restrict disclosure of Supplier's proprietary information.

The following are the types of insurance policies and the minimum limits of insurance coverage which shall be maintained by Supplier during the entire term of the Contract:

a) WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY INSURANCE, as will protect him from claims under Workers' Compensation Laws. The Workers' Compensation section of the policy shall afford statutory limits and be in accordance with all Louisiana Workers' Compensation Statutes. The Employers' Liability limit shall not be less than \$1,000,000 each accident for bodily injury by accident and \$1,000,000 each employee/policy limit for bodily injury by disease. Whenever any vessel or floating equipment is involved, the insurance shall afford coverage under the Federal Longshoremen's and Harbor Workers' Act, and shall also include protection for injuries and/or death to Masters and Members of the crews of vessels with statutory limits in accordance with the Jones Act.

b) COMMERCIAL GENERAL LIABILITY INSURANCE, with a limit of not less than \$1,000,000 each occurrence and \$2,000,000 general aggregate, including Explosion, Collapse, and Underground Property Damage Hazards. The Products-Completed Operations aggregate limit shall not be less than \$1,000,000 each occurrence. The general aggregate limit shall apply separately to this project.

c) BUSINESS AUTOMOBILE INSURANCE, which shall cover liability arising from any auto (including owned, hired, and non-owned vehicle). The limit of liability shall not be less than \$1,000,000 combined with each accident for all injuries, property damage, and/or death resulting from one occurrence.

d) ERRORS AND OMISSIONS/PROFESSIONAL LIABILITY INSURANCE, whichever is applicable to the particular profession or service to be provided, with limit of not less than \$1,000,000 each Claim, with a \$2,000,000 annual aggregate, without any restrictive "negligent act, negligent error, or negligent omission" clause and sufficient to protect the Supplier, SWBNO, and the City, for a five (5) year period from completion of this contract, against any and all claims which may arise from the Supplier's negligent performance of work described herein.

In addition, Supplier shall be required to furnish to the Risk Manager of SWBNO all copies of investigative reports with regard to any and all claims filed with the Supplier and his insurance carriers relative to the contract, with the exception of claims filed against his Workers' Compensation Insurance. Such reports shall include date, location, and description of loss as well as amounts of settlements or judgments in order that annual aggregate limits may be monitored by SWBNO for Supplier's compliance with these specifications.

The furnishing of insurance as provided above shall not relieve Supplier of its responsibility for losses not covered by insurance. Prior to the signing of the contract, evidence of all such applicable insurance satisfactory to SWBNO shall be filed with the Risk Manager of SWBNO. All policies shall be in insurance companies authorized to do business in Louisiana and shall remain in full force and effect until the final completion of the work and acceptance thereof by the authority of SWBNO. Supplier and/or his insurer shall notify the Risk Manager of SWBNO at least thirty (30) days in advance of any insurance coverage to be canceled or of any insurance coverage that will expire. Supplier shall simultaneously furnish the SWBNO evidence of new coverage to be effective the same day and hour of the expired or canceled coverage. In the event Supplier fails to submit this evidence of new coverage five (5) days prior to cancellation date or expiration date of any policy or policies, SWBNO will obtain the required coverage to become effective on date of cancellation or expiration of said policies. The cost of such new coverage shall be at the expense of Supplier and any expenditure incurred by SWBNO of this coverage will be deducted from any balance due to Supplier.

Other Insurance Provisions. The insurance policies are to contain, or be endorsed to contain, the following provisions:

Additional Insured Status. The Supplier will provide, and maintain current, a Certificate of Insurance naming the City of New Orleans, SWBNO, its departments, political subdivisions, officers, officials, employees, and volunteers are to be covered as “Additional Insureds” on the CGL policy with respect to liability arising out of the performance of this agreement. General liability coverage can be provided in the form of an endorsement to the Supplier’s insurance (at least as broad as ISO Form CG 20 10 11 85 or both CG 20 10 and CG 20 37 forms if later revisions used). The Certificate of Insurance, as evidence of all required coverage, should name the Sewerage and Water Board of New Orleans Risk Manager and the City of New Orleans Risk Manager as Certificate holders and be delivered via U.S. Mail to 625 St. Joseph St., New Orleans, LA 70165 and 1300 Perdido Street, 9E06—City Hall, New Orleans, LA 70112 respectively.

Primary Coverage. For any claims related to this contract, the Supplier’s insurance coverage shall be primary insurance as respects SWBNO, its departments, political subdivisions, officers, officials, employees, and volunteers. Any insurance or self-insurance maintained by SWBNO shall be non-contributing to the Supplier’s coverage.

Claims Made Policies. If applicable, the retroactive date must be shown and must be before the date of the contract or the beginning of work. If the coverage is canceled or non-renewed, and not replaced with another claims-made policy, Supplier must purchase “extended reporting” coverage for minimum of 5 years after the termination of this agreement

Waiver of Subrogation. The Supplier and its insurers agree to waive any right of subrogation which any insurer may acquire against SWBNO by virtue of the payment of any loss under insurance required by this contract.

Notice of Cancellation. Each insurance policy required above shall provide that coverage shall not be canceled, except with prior notice to SWBNO of no less than 60 days.

Acceptability of Insurers. Insurance is to be placed with insurers licensed and authorized to do business in the State of Louisiana with a current A.M. Best's rating of no less than A:VII, unless otherwise acceptable to.

The Supplier will provide SWBNO's Risk Manager (at Attn: Risk Manager, 625 St. Joseph St., New Orleans Louisiana 70165) and the City of New Orleans Risk Manager (at Attn: Risk Manager, 1300 Perdido Street, 9E06 City Hall, New Orleans, LA 70112) within 10 calendar days of the Effective Date and at any other time at the SWBNO's request the following documents:

Proof of coverage for each policy of insurance required by this Agreement;

Copy of the fully executed Agreement;

Copies of all policies of insurance, including all policies, forms, and endorsements; and

Statements disclosing any policy aggregate limit.

Without notice from the SWBNO, the Supplier will:

Replenish any policy aggregate limit that is impaired before commencement of any work or continuation of any work under this Agreement;

Substitute insurance coverage acceptable to SWBNO within 30 calendar days if any insurance company providing any insurance with respect to this Agreement is declared bankrupt, becomes insolvent, loses the right to do business in Louisiana, or ceases to meet the requirements of this Agreement; and

Notify SWBNO's Risk Manager in writing within 48 hours of its receipt of any notice of non-renewal, cancellation, or reduction in coverage or limits affecting any policy of insurance maintained under this Agreement and provide proof of reinstatement or acceptable substitution prior to such non-renewal, cancellation, or reduction in coverage or limits.

ARTICLE 30 - Suspension

A. Suspension by Owner of Work at Site. Owner shall have the right, at any time, to suspend Work at the Site upon written notice to Supplier. Any direct cost incurred by Supplier in accordance with any such suspension (including storage costs) shall be payable by Owner upon submission of Supplier's invoice(s), provided that actions of Supplier did not directly cause Owner to suspend Work on the Site. Performance of Supplier's obligations shall be extended for a period reasonably necessary to overcome the effects of such suspension. Suspension right limited to one hundred and eighty (180) days in the aggregate.

B. Suspension by Supplier. Supplier shall have the right to suspend all Work, including the delivery of any Equipment, upon the failure of Owner to make any payment in accordance with Article 6(A). Without limiting the foregoing, Supplier shall have the right to suspend any shipment of the Equipment and may, but shall not be obligated to, ship such Equipment to storage in accordance with Article 11 if all payments due prior to the applicable Scheduled Major Component Delivery Date have not been made. Any cost incurred by Supplier in accordance with any such suspension (including storage costs) shall be payable by Owner upon submission of Supplier's invoice(s). Performance of Supplier's obligations shall be extended for a period of time reasonably necessary to overcome the effects of such

suspension, except that Supplier's suspension shall not be deemed to extend the Warranty Period hereunder, provided that actions of Supplier did not directly cause Owner to suspend Work on the Site.

ARTICLE 31 - Reserved

ARTICLE 32 - Termination for Cause

The Owner may terminate this Contract upon occurrence of any of the following events:

- (A) Supplier shall have defaulted in its performance in any material respect under any material provision of this Contract;
- (B) failure of the Supplier to begin the work under the Contract within the time specified unless excused by the Owner or the terms of this Contract;
- (C) failure of Supplier to obtain or maintain its payment or performance bond in accordance with Article 7 of this Contract;
- (D) if the Supplier shall become insolvent or declared bankrupt, or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against the Supplier unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors;
- (E) if the Supplier attempts to assign rights under the Contract without the prior consent of the Owner; or
- (F) if Supplier ceases to carry on its business or operations.

Owner shall first have provided Supplier with the written notice of the occurrence which can constitute termination for cause and of Owner's intention to terminate this Contract, as a result of such occurrence, and either:

- (A) within fourteen (14) days of Supplier's receipt of Owner's written notice, Supplier has failed to acknowledge receipt of such notice indicating that Supplier has begun to investigate the issue pertaining to the occurrence; or
- (B) with respect to an occurrence that can be cured within thirty (30) days, Supplier shall have failed to cure the occurrence within thirty (30) days after receipt of such notice (or such extended period as is considered reasonable by the Parties); or
- (C) with respect to an aforementioned occurrence that cannot be cured within thirty (30) days, Supplier, upon its receipt of such notice, either:
 - (i) failed to commence to cure the abovementioned occurrence or diligently pursue such cure; or
 - (ii) failed to provide to Owner reasonable evidence that there has been no such aforementioned occurrence.

Supplier may terminate this Contract upon occurrence of any of the following events:

- (A) Owner shall have defaulted in its performance in any material respect under any material provision of this Contract;
- (B) Owner shall have failed to pay any amount payable to Supplier when due in accordance with this Contract;
- (C) If the Owner shall become insolvent or declared bankrupt, or commit any act of bankruptcy or insolvency, or allow any final judgment to stand against the Owner unsatisfied for a period of forty-eight (48) hours, or shall make an assignment for the benefit of creditors; or
- (D) if the Owner attempts to assign rights under the Contract without the prior consent of the Supplier.

Supplier shall first have provided Owner with the written notice of the occurrence which can constitute termination for cause and of Supplier's intention to terminate this Contract, as a result of such occurrence, and either:

- (A) within fourteen (14) days of Owner's receipt of Supplier's written notice, Owner has failed to acknowledge receipt of such notice indicating that Owner has begun to investigate the issue pertaining to the occurrence; or
- (B) with respect to an occurrence that can be cured within thirty (30) days, Owner shall have failed to cure the occurrence within thirty (30) days after receipt of such notice (or such extended period as is considered reasonable by the Parties); or
- (C) with respect to an aforementioned occurrence that cannot be cured within thirty (30) days, Owner, upon its receipt of such notice, either:
 - (i) failed to commence to cure the abovementioned occurrence or diligently pursue such cure; or
 - (ii) failed to provide to Supplier reasonable evidence that there has been no such aforementioned occurrence.

ARTICLE 33 - Reserved

ARTICLE 34 - Termination for Convenience

SWBNO may terminate this Contract at any time during the term of the Contract by giving Supplier written notice of its intention to terminate at least thirty (30) days before the intended date of termination. In the event SWBNO elects to terminate for convenience, SWBNO shall be obligated to pay Supplier only for those services performed up to and through the date of termination.

ARTICLE 35 - Termination for Non-appropriation

This Contract may be terminated immediately and without penalty if, for any reason, funds sufficient to maintain the Contract during and fiscal year are not appropriated.

ARTICLE 36 - Reserved

ARTICLE 37 - Reserved

ARTICLE 38 - Assignment and Change in Control

A. The Parties' Right to Assign. Neither this Contract nor any interest herein nor any claim hereunder (other than accounts receivable or contract rights to payment) shall be assigned or transferred by either Party, nor shall performance hereunder be delegated by either Party to any other party without prior written authorization of the other Party, such consent not to be unreasonably withheld.

B. All Other Assignments and Transfers by Owner. All other assignments or transfers by Owner of any or all of its duties or rights under this Contract (by operation of law or otherwise) are subject to Supplier's prior written consent. Further, Owner agrees that, until Owner receives title to the Equipment as set forth herein, Owner shall not, directly, or indirectly sell, offer to sell, or otherwise broker the Equipment.

Owner, however, retains the unrestricted sole right to assign this Contract to its Contractor for the purpose of the execution and completion of the Project. Upon such assignment, Supplier shall coordinate with the assignee all, or part of, the activities associated with engineering, fabrication, assembly, shop testing, delivery and field testing of the equipment, that otherwise would have been done with the Owner as established in this Contract.

ARTICLE 39 - Reserved

ARTICLE 40 - Reserved

ARTICLE 41 - Governing Law

The law of the State of Louisiana shall govern this contract. Exclusive venue for any lawsuits of disputes arising from or related to this solicitation or an agreement negotiated pursuant thereto shall be in the Civil District Court for the Parish of Orleans. This agreement shall be construed and enforced in accordance with the laws of the State of Louisiana, excepting its conflict of law provisions.

ARTICLE 42 - Effective Date

This Contract shall become effective when it is signed by both Parties ("Effective Date").

ARTICLE 43 - Acceptance of the Contract

Acceptance of this Contract, whether by written acknowledgment or commencement of performance, is expressly limited to the provisions of the Contract, and no modification, deletion or addition shall be effective unless a duly authorized written amendment to the Contract, signed by Owner and Supplier, is entered into, notwithstanding any contrary or additional provisions (including any preprinted forms) in any communications from Supplier or payment or acceptance of delivery by Owner.

ARTICLE 44 - Right to Audit Records

Supplier shall maintain relevant records pertaining to reports, documents, deliverables, employee time sheets, records of financial transactions, and other evidence, regardless of form, sufficient to properly reflect all costs claimed to have been incurred and services performed pursuant to this Contract relating specifically to the Technically Advisory Services, and Change Orders issued on a unit price basis only. It is specifically understood that no other aspects of this Contract are subject to audit. The scope of any audit shall be limited to the verification of invoices that were issued on a cost-plus margin basis or on a time and materials basis (including Change Orders). All records shall be retained, and shall be subject to examination and audit by Owner's personnel or by Owner's agents (herein after "Authorized Auditors"), for a period of not less than three (3) years following final payment made by Owner hereunder or the expiration date of this Contract, whichever is later.

Supplier, as applicable to the Technical Advisory Services provided under this Contract, shall be subject at any time, with thirty (30) Days, prior written notice to audits or examinations by Authorized Auditors.

ARTICLE 45 - Entire Agreement

This Contract represents the entire agreement between the Parties and supersedes in its entirety all prior agreements concerning the subject matter hereof, and no modification, amendment, revision, waiver, or other change shall be binding on either Party unless consented to in writing by the Party's authorized representative. Any oral or written representation, warranty, course of dealing, or trade usage not contained or referenced herein shall not be binding on either Party. Each Party agrees that it has not relied on, or been induced by, any representations of the other Party not contained in this Contract.

ARTICLE 46 - Miscellaneous Provisions

A. Third Party Beneficiaries. This Contract and its provisions are for the benefit of the Parties hereto and not for any other third party.

B. Non-Waiver. Waiver by either Party of any right under this Contract shall not be deemed a waiver by such Party of any other right hereunder.

C. Invalidity. The invalidity in whole or in part of any part of this Contract shall not affect the validity of the remainder of this Contract.

D. Counterparts. This Contract may be signed in any number of counterparts, each of which shall constitute one and the same instrument.

E. Spare Parts. Supplier shall provide Owner a 3 Year Recommended Spare Parts List for the Equipment, with prices and delivery lead times, not later than the Effective Date. Supplier shall indicate the minimum recommended inventory and identify the specific item or items to which each item applies for routine maintenance at installation, start up and continuous operation for each of the first three years.

Supplier shall also indicate whether the recommended spare is a stock item or special item, location of nearest supply point and approximate lead time required for shipment.

F. Independent Supplier. Supplier is an independent contractor and shall not be regarded as an employee or agent of Owner.

G. Article Headings. The captions used for the Articles in this Contract are inserted only as a matter of convenience and for reference and in no way define, limit, or describe the scope of the intent of this Contract or any Article hereof.

IN WITNESS WHEREOF

The Parties have caused this document to be executed by their authorized representatives as of the date set forth below.

SUPPLIER

By:

(Signature)

(Printed Name)

(Title)

(Date)

OWNER

By:

(Signature)

(Printed Name)

(Title)

(Date)