

REQUEST FOR PROPOSALS
TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET
INFORMATION TECHNOLOGY DEPARTMENT
RFP # 15-0325



INFORMATION TECHNOLOGY DEPARTMENT

COUNTY COMMISSIONERS

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REQUEST FOR PROPOSALS
TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET
INFORMATION TECHNOLOGY DEPARTMENT
RFP # 15-0325

In accordance with NCGS 143-129.8, sealed proposals addressed to Lena Butler, Purchasing Supervisor, New Hanover County Finance Office, 230 Government Center Drive, Suite 165, Wilmington, North Carolina 28403 and marked “**TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET -RFP # 15-0325**” will be accepted until **5:00 P.M. EST, Monday May 4th, 2015.**

Proposals submitted under this section are not subject to public inspection until after award and execution of contract; therefore, there will be no public bid opening. Proposals will be evaluated and selected bidders may be requested to provide a demonstration of their proposed system.

Instructions for submitting proposals and complete requirements and information may be obtained by visiting the County’s website at <http://www.nhcgov.com/business-nhc/bids>.

The New Hanover Information Technology Department and the Board of County Commissioners reserves the right to accept or reject any or all proposals and to make the award that will be most advantageous to the County.

Lena L. Butler, Purchasing Supervisor
New Hanover County
(910) 798-7190

Released: Wednesday, April 15, 2015

Section 2 Instructions and General Conditions

2.1 Schedule

Advertisement	<i>Wednesday, April 15, 2015</i>
Mandatory pre-bid conference	<i>Thursday, April 23, 2015 at 10:00 AM EST</i>
Deadline for Questions	<i>Monday, April 27, 2015 at 5:00 PM EST</i>
Answers provided	<i>Wednesday, April 29, 2015 by 5:00 PM EST</i>
Deadline for Receipt of Proposals	<i>Monday, May 4, 2015 at 5:00 M EST.</i> New Hanover County Finance Office 230 Government Center Drive, Suite 165 Wilmington, North Carolina 28403
Demonstrations	<i>To Be Determined</i>
Proposed Date of Award	<i>Monday, May 18, 2015</i>

2.2 Preparation of Proposal

2.2.1 Completion of Proposal: Bidders are instructed to submit one (1) original and two (2) clearly identified copies of their proposal as well as one (1) copy on CD/DVD/USB drive.

Bidders are expected to examine the specifications, schedule, and all instructions. Failure to do so will be at the Bidder's risk. Each bidder shall furnish the information required by the bid form. Bids must be on the bid form contained in this bid package.

All prices and notations shall be written in ink or typed. Discrepancies between words and numerals will be resolved in favor of words. Discrepancies between the multiplication of units of work and unit prices will be resolved in favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.

Changes or corrections made on the Bid should be initialed by the individual signing the bid. No corrections will be permitted once bids have been opened.

2.2.2 Required Specifications: Bidder's bid shall be in strict accordance with the County's specifications. The Information Technology Department and the Board of County Commissioners reserves the right to reject any and all proposals deemed non-responsive to the requirements set forth in the RFP.

2.2.3 Deviations: New Hanover County reserves the right to allow or disallow minor deviations or technicalities should the County deem it to be to the best interest of the County. New Hanover County shall be the sole judge of what is to be considered a minor deviation or technicality.

2.2.4 Warranties

2.2.4.1 Bidder warrants that all goods furnished shall be free from all defects, and shall conform in all respects to the technical specifications established by the County.

2.2.4.2 If the County's specifications include a statement of the particular purpose for which the goods will be used, the goods offered by bidder shall be fit for this purpose.

2.2.5 Mandatory Pre-bid Conference: All Bidders are required to attend a mandatory Pre-bid conference to be held at 320 Chestnut Street in the jobsite trailer on Thursday, April 23, 2015, at 10:00 am. A walk through of the job in progress will be required.

2.3 Submission of Bid Proposal

2.3.1 Bonds: A bid bond is not required; however, due to the nature of this project, performance and payment bonds may be required.

2.3.2 Proposal: All proposals in response to this RFP shall be delivered to the address listed below. Any proposal arriving after the deadline will not be accepted and will not be considered. Bidders are instructed to submit one (1) original and two (2) clearly identified copies of their proposal as well as one (1) copy on CD/DVD/USB drive in a sealed envelope properly marked "**TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET -RFP # 15-0325**" and shall be addressed to County at the following address:

New Hanover County Finance Office
Attn: Lena Butler, Purchasing Supervisor
230 Government Center Drive, Suite 165
Wilmington, NC 28403

Delivery of Proposals to the proper individual is the sole responsibility of the Bidder. Proposals are due Monday, **May 4, 2015 at 5:00 PM.**

- 2.3.3 Unacceptable Bids:** Bids submitted via telegraph, facsimile (FAX), telephone, and electronic means, including but not limited to e-mail, in response to the Invitation for Bids will not be acceptable.
- 2.3.4 Quality:** Items offered must at least meet specifications called for and must be of quality which will adequately serve the use and purpose for which it is intended.
- 2.3.5 Description:** Bidders must furnish with their bid detailed descriptive literature and general specifications and other pertinent data necessary for evaluation of their bid. Samples of items, when required, must be submitted within the time specified, and unless otherwise specified by the County at no expense to the County.
- 2.3.6 Signature Required:** Please be sure to sign your bid. Failure to sign bid prior to submittal shall render bid invalid.
- 2.3.7 Late Bids:** Late bids will not be accepted. It is the responsibility of the Bidder to have the bid in the office specified in the RFP by the time and date noted.

2.4 Communication

2.4.1 After the bid issue date, all communications between the County and prospective Bidders regarding this bid request shall be in writing. Any inquires, requests for interpretation, technical questions, clarification, or additional information shall be directed to **Kevin Caison with NHC by email – kcaison@nhcgov.com** . All questions concerning this bid shall reference the bid number, section number and paragraph. Questions and responses affecting the specifications of the bid will be provided by issuance of an Addendum. **All questions shall be received no later than 5:00 P.M., EST, Monday, April 27, 2015.**

2.4.2 Bidders may not have communications, verbal or otherwise, concerning this RFP with any personnel or boards from New Hanover County, other than the person listed in this section. If any vendor attempts any unauthorized communication, the proposal will be rejected.

2.4.3 All Bidders who intend to submit a proposal on this project should send an email to lbutler@nhcgov.com including pertinent contact information. This will ensure that you receive all addenda issued for this RFP; if applicable.

2.5 Material and Workmanship

All equipment furnished will be guaranteed to be new and of current manufacture, to meet all requirements of these specifications, and to be ready for use at time of delivery. All workmanship will be of high quality and accomplished in a professional manner so as to insure that the equipment is functional.

2.6 Trade Secret Confidentiality

Proposals submitted shall not be subject to public inspection until a contract is awarded.

According to General Statutes 132 - 1.2, trade secrets contained in a bid may be kept confidential if the bidder, at the time the bid is submitted, designates the secret and requests that it be kept confidential. This right of privacy will be construed as narrowly as possible to protect the interests of the Bidder while attempting to maximize the availability of information to the public.

2.7 Information Technology Goods and Services

In recognition of the complex and innovative nature of information technology goods and services and of the desirability of a single point of responsibility for contracts that include combinations of purchase of goods, design, installation, training, operation, maintenance, and related services, the County is issuing this RFP as per NCGS 143-128.8.

Contracts for information technology may be entered into under a request for proposals procedure that satisfies the following minimum requirements:

- (1) Notice of the request for proposals shall be given in accordance with G.S. 143-129(b).
- (2) Contracts shall be awarded to the person or entity that submits the best overall proposal as determined by the awarding authority. Factors to be considered in awarding contracts shall be identified in the request for proposals.

The awarding authority may negotiate with any proposer in order to obtain a final that best meets the needs of the awarding authority. Negotiations allowed under this section shall not alter the contract beyond the scope of the original request for proposals in a manner that:

- (i) deprives the proposers or potential proposers of a fair opportunity to compete for the contract; and
- (ii) would have resulted in the award of the contract to a different person or entity if the alterations had been included in the request for proposals.

Proposals submitted under this section shall not be subject to public inspection until a contract is awarded.

2.8 Withdrawal of Bids

Bidders may withdraw or withdraw and resubmit their proposal at any time prior to the closing time for receipt of proposals. NO proposal may be withdrawn after the scheduled closing time for receipt of proposals for a period of ninety (90) days.

2.9 Demonstrations

Prior to the determination of the award, the County may require a thorough demonstration of the proposed system by selected finalists. If demonstrations are requested, proposing bidders must be prepared to demonstrate in the event they become a finalist. These demonstrations should clarify any portion of their response or describe how the functional requirements will be accomplished. Failure to demonstrate requested components or a production system may be grounds for disqualification. Bidders who are deemed finalists will be notified and asked to conduct their presentation during a designated week to be determined.

2.10 Selection, Notification, and Award of Contract

Prior to the selection and award of contract to the successful vendor, an evaluation team will evaluate the RFP responses received from each vendor.

The County intends to award a contract for a **TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET**; however, the County specifically reserves the following rights:

1. The County reserves the right to accept or reject any or all proposals or any portion thereof.
2. The County reserves the right to accept all or part of any proposal depending solely upon the requirements and needs of the County.
3. The County reserves the right to seek clarifications of any proposal submitted or specific aspects of any proposal prior to the award of the contract. After seeking such clarification, the County will allow the Bidder an opportunity to provide the requested clarification.

2.11 Evaluation Criteria

If an award is made as a result of this RFP, it shall be awarded to the vendor whose proposal is most advantageous to the County using the Criteria listed below:

1. Quality, clarity and responsiveness of bid in conformance with instructions, conditions, and format -15%

2. Features and functionality deemed most advantageous and cost effective to the County-20%
3. Installation, implementation, and training plan-20%
4. Cost of proposed system- 35%
5. Warranty – 10%

2.12 Ownership of Documents

All material received in response to this RFP shall become the property of the County and will not be returned to the vendors.

2.13 Taxes

New Hanover County is exempt from and will not pay Federal Excise Taxes or Transportation Taxes.

If bidder is required to charge North Carolina sales tax on bidder's sales, bidder shall not include it as part of the bid price. The County will pay North Carolina sales tax over and above bid prices when invoiced.

2.14 Equal Opportunity

The non-discrimination clause contained in Section 202 (Federal) Executive Order 11246, as amended by Executive Order 11375, relative to Equal Employment Opportunity for all persons without regard to race, color, religion, sex or national origin, and the implementing rules and regulations prescribed by the Secretary of Labor, are incorporated herein.

The Proposer agrees not to discriminate against any employees or applicant for employment because of physical or mental handicap in regard to any position for which the employees or applicant is qualified. The Proposer agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices.

Pursuant to GS 143-48, New Hanover County invites and encourages participation in this procurement process by businesses owned by minorities, women, and handicapped.

2.15 Responsibility of Compliance with Legal Requirements

The bidder's products, service and facilities shall be in full compliance with any and all applicable state, federal, local, environmental and safety laws, regulations, ordinances and standards or any standards adopted by nationally recognized testing facilities regardless of whether or not they are referred to in the bid documents.

2.16 Indemnity

Bidders shall indemnify and hold the County, its agents and employees, harmless against any and all claims, demands, causes of action, or other liability, including attorney fees, on account of personal injuries or death or on account of property damages arising out of or relating to the work to be performed by Vendor hereunder, resulting from the negligence of or the willful act or omission of Vendor, his agents, employees and subcontractors.

2.17 Insurance.

Before commencing any work, the Bidder shall procure insurance in his/her name and maintain all insurance policies for the duration of the contract of the types and in the amounts listed in this RFP. The insurance shall provide coverage against claims for injuries to persons or damages to property which may arise from operations or in connection with the performance of the work hereunder by the Bidder, his agents, representatives, employees, or subcontractors, whether such operations are done by himself/herself or anyone directly or indirectly employed by him/her.

2.17.1 Workers Compensation and Employers Liability Insurance.

Covering all of the Bidder's employees to be engaged in the work under this contract, providing the required statutory benefits under North Carolina Workers Compensation Law, and employer's liability insurance providing limits at least in the amount of \$500,000/500,000/100,000 applicable to claims due to bodily injury by accident or disease.

2.17.2 Commercial General Liability.

Including coverage for independent contractor operations, contractual liability assumed under the provisions of this contract, products/completed operations liability and broad form property damage liability insurance coverage. Exclusions applicable to explosion, collapse and underground hazards are to be deleted when the work involves these exposures. The policy shall provide liability limits at least in the amount of \$1,000,000 per occurrence, combined single limits, applicable to claims due to bodily injury and/or property damage. New Hanover County shall be named as an additional insured under this policy.

2.17.3 Automobile Liability Insurance.

Covering all owned, non-owned and hired vehicles, providing liability limits at least in the amount of \$1,000,000 per occurrence combined single limits applicable to claims due to bodily injury and/or property damage.

2.17.4 Cyber Liability

Bidder shall maintain cyber liability insurance in the amount of \$1,000,000 each occurrence and insuring against liability to cover expenses associated with data breaches, including; notification costs, credit monitoring, costs to defend claims by state regulators, fines and penalties and loss resulting from identity theft.

2.18 Addendum

The bid package constitutes the entire set of bid instructions to the bidder. The County shall not be responsible for any other instructions, verbal or written, made by anyone. Any changes to the specifications will be in the form of an Addendum.

2.19 Compliance with Bid Requirements

Failure to comply with these provisions or any other provisions of the General Statutes of North Carolina will result in rejection of bid.

2.20 Costs of Proposals

The cost for developing the proposals will be borne by the Bidders. New Hanover County is not liable for any costs incurred by bidders in the preparation and presentation of proposals, and demonstrations submitted in response to this RFP, or for travel costs for site visits to New Hanover County.

2.21 Right to Reject Proposals

The Information Technology Department and the Board of County Commissioners reserves the right to accept or reject any or all proposals and to make the award that will be most advantageous to the County.

Section 3 Purpose

This request for proposals (RFP) is issued by New Hanover County's Information Technology Department to solicit proposals from interested VENDORS who wish to be considered as a provider of a TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET. This TELECOMMUNICATIONS CABLING SYSTEM will be used to provide new information technology systems and services in a renovated space in the building located at 320 Chestnut Street, Wilmington, North Carolina. New Hanover County will occupy space in the building and sublet space to other tenants

Your proposal shall include the following:

- Detailed statement of work to furnish, install, terminate, test and warranty the TELECOMMUNICATIONS CABLING SYSTEM in accordance with the technical specifications, performance and installation requirements contained herein and in the drawings and others that may be applicable, which are available on site from the Owner, Architect and General Contractor (GC);
- Project management timeline for installation and related services for the proposed system;
- Warranty and warranty support service for proposed system;
- List all materials to be provided for the proposed System.

Section 4 Technical Specifications

See attached New Hanover County Telecommunications Specifications 20150408

Section 5 Requirements

Requirements Chart Information

Each vendor is required to complete the requirements chart located in Appendix A. Each requirement has been assigned a unique number. The requirements are grouped in the following major headings:

- 1 INTRODUCTION
- 2 TECHNICAL BACKGROUND
- 3 SCOPE OF WORK
- 4 GENERAL REQUIREMENTS
- 5 TECHNICAL REQUIREMENTS
- 6 BILL OF MATERIALS

Response Instructions and Codes

In responding to the requirements, the codes indicated below should be entered in column “Response Code” of the requirements chart. If not self-explanatory, the vendor must provide narrative responses to each of the requirements explaining “how” the requirement functions in proposed system in the adjacent column. An omitted response will be assumed to be the same as “N”, the requirement is not available.

Response Code	Description
Y = Yes	Requirement currently exists in proposed system and can be demonstrated. The cost of the requirement is included in the cost of the base software.
N = No	Requirement is not available and cannot be provided.
D = Under Development	Requirement is currently under development, in Beta test, or not released, but will be available in proposed system at no additional cost.
O = Other	Other – see comments.

Vendor Qualifications

Each vendor must provide the following information about its qualifications.

1. Vendor shall submit an organization chart of its employees.
2. The qualifications and resumes of key individuals should be detailed, including his or her qualifications, highlighting similar projects successfully managed.
3. Vendor shall submit company D&B number for creditor check.

Vendor References

Each vendor submitting a proposal is to provide a list of the counties you serve and at least three references of current customers (one must be in North Carolina) that have implemented a similar system. Include timeline from award to go live date.

Vendor Contract

Vendor shall submit with their proposal a copy of their professional services contract for review by the County's Legal Department.

TELECOMMUNICATIONS CABLING SYSTEM – 320 CHESTNUT STREET

RFP # 15-0325

Deadline for Receipt of Bids: 5:00 p.m. EST, Monday, May 4, 2015

I certify that this bid is made without prior understanding, agreement or connection with any corporation firm, or person submitting a bid for the same services and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences, and civil damage awards. I agree to abide by all conditions of this bid and certify that I am authorized to sign this bid for the bidder.

Describe and list all costs that would be associated with implementation of your system.

Description	Total
System Components	
CABLES	
CONNECTORS & MOUNTING PLATES	
TERMINATION HARDWARE	
EQUIPMENT RACKS	
SUPPORT HARDWARE	
MISCELLANEOUS ITEMS	
Total System Components Cost	
System Services	
Installation	
Project Management	
Testing	
Documentation	
Warranty	
Other	
Total Services Cost	
Total Proposal Cost	

Prices quoted in bid shall be FOB Destination and include all costs; shipping, delivery, setup, and training. Bidder shall guarantee the prices quoted against any increase for one hundred twenty (120) days or completion of project, whichever comes first.

Notice to Proceed

The undersigned, if awarded the bid, hereby agrees to execute a contract with New Hanover County in the form specified after the award and to begin the process of providing the Recording System as specified in this bid upon receipt of a Purchase Order issued by New Hanover County and the fully executed contract.

Addendum

Receipt of the following Addendum is acknowledged:

Addendum No. 1 OPS 20150409 Date 04/09, 2015 (included in RFP)

Addendum No. _____ Date _____, 2015

Bidder Information

Please check as appropriate and complete the items below.

The Bidder is:

_____ An Individual

_____ A Partnership between: _____

_____ A Joint Venture consisting of: _____

_____ A Corporation organized under the laws of the State of _____

Signature and Date of Representative	
NAME AND TITLE:	
COMPANY:	
ADDRESS:	
TELEPHONE:	
EMAIL:	

**New Hanover County North Carolina
TELECOMMUNICATIONS CABLING SYSTEM
Appendix A: System Requirements**

Major Section	Description	Response Code	Explanation or Comment
1	INTRODUCTION		
1.1	GENERAL BACKGROUND		
1.2	DOCUMENT ORGANIZATION		
1.3	CABLING INSTALLATION AND TEST SCHEDULE		
1.4	CONTRACTOR QUALIFICATIONS		
1.5	JOB COORDINATION		
2	TECHNICAL BACKGROUND		
2.1	CABLING SYSTEM OVERVIEW		
2.2	WORKSTATION CABLING		
2.3	TELECOMMUNICATION CLOSETS		
2.4	RELAY RACKS		
2.5	OPEN PLAN FURNITURE CABLE IN-FEEDS AND WHIPS		
2.6	CATV		
3	SCOPE OF WORK		
3.1	CONTRACTOR RESPONSIBILITIES		
3.2	OUT-OF SCOPE WORK		
3.3	WORK PERFORMED BY OTHERS		
4	GENERAL REQUIREMENTS		
4.1	CONFIDENTIALITY		

Legend

Response Code: Y=Yes, N=No, D=Under Development, O=Other

Major Section	Description	Response Code	Explanation or Comment
4.2	CLARIFICATIONS		
4.3	SCHEDULE ADHERENCE		
4.4	SUBSTITUTIONS, DEVIATIONS OR WAIVERS		
4.5	DISCREPANCIES/VALIDATION		
4.6	COMPLIANCE AND EXCEPTIONS		
4.7	INSURANCE		
4.8	TITLE & RISK OF LOSS		
4.9	PROJECT TEAM		
4.1	ABILITY TO PERFORM		
4.11	LABOR HARMONY		
4.12	FIELD COORDINATION AND COOPERATION		
4.13	SUB-CONTRACTING		
4.14	WORK-IN-PROGRESS REVIEWS		
4.15	MATERIALS HANDLING		
4.16	MATERIALS QUALITY ASSURANCE		
4.17	WARRANTY		
4.18	CODE ADHERENCE		
4.19	FIRE SAFETY		
5	TECHNICAL REQUIREMENTS		
5.1	BACKBONE CABLING PLANT		
5.2	LATERAL/LOCAL DISTRIBUTION CABLING SYSTEM		

Legend

Response Code: Y=Yes, N=No, D=Under Development, O=Other

Major Section	Description	Response Code	Explanation or Comment
5.3	INSTALLATION		
5.4	TESTING		
5.5	TRAINING		
5.6	LABELING		
5.7	MATERIAL SPECIFICATIONS		
	TABLE 5.1: BILL OF MATERIALS		
ADD. # 1	ADDENDUM 1 – Outside Plant - Optical Fiber Cable		
ADD. # 1	PROJECT OVERVIEW		
ADD. # 1	SCOPE OF WORK		
ADD. # 1	FIBER OPTIC TESTING		
ADD. # 1	BILL OF MATERIALS		

Legend

Response Code: Y=Yes, N=No, D=Under Development, O=Other

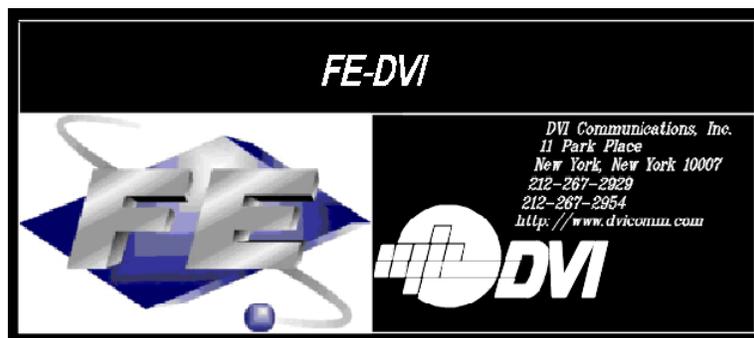


**320 Chestnut Street
Wilmington, North Carolina**

**TELECOMMUNICATIONS CABLING SYSTEM
SPECIFICATIONS**

**PREPARED BY:
FEDERAL ENGINEERING, INC.
DVI COMMUNICATIONS, INC.**

April 8, 2015



New Hanover County

TELECOMMUNICATIONS CABLING SYSTEM

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1. INTRODUCTION

1.1 GENERAL BACKGROUND

The New Hanover County, the Owner or Client, is renovating space in the building located at 320 Chestnut Street, Wilmington, North Carolina. The Owner will occupy space in the building and sublet space to other tenants.

The 1st floor will house the main distribution frame (MDF)/intermediate distribution frame (IDF); the 2nd, 3rd, 4th, 5th, & 6th floor will have full IDF closets.

Each IDF shall be capable of supporting the owner and any tenants that will occupy the building.

The Owner's Technology Consultant (Owner's Consultant) for the project is Federal Engineering (**FE**) & DVI Communications, Inc. (**DVI**).

As part of its occupancy of the space, the Owner is installing a new Telecommunications Cabling System (TCS). It includes the following:

- Category 6A UTP plenum cabling for voice and data and all related station and IDF RJ-45 termination jack, plates, panels, labeling and accessories;
- Cat. 6A cabling in the ceiling for Wi-Fi Access Points;
- Coax RG-6, Quad Shield cable, for TV locations,
- One twenty four (24) strand multi-mode optical fiber cable (MMFO) run from the ground floor MDF to each IDF;
- One (1) 100- pair Category 3 cable run from the 1st floor MDF to each IDF;
- Fiber Optic (FO) terminations;
- New cable/equipment rack and related vertical cable trough's in each MDF/IDF Rooms;
- Overhead Cable ladder in the MDF/IDF's;
- All other dress bars, rings, guides, cable hangers, Velcro tie wraps and other miscellaneous hardware and components to provide a complete, working system; and,
- Copper and FO patch cables for station and LAN equipment connections.

In addition to the above work, contractor is responsible for complete testing, certification, "AS-BUILT" drawings in AutoCAD & PDF format, and Excel documentation of all cables and equipment per applicable EIA and BICSI standards.

This document describes the TCS design, specifications, standards and requirements for the Bid to be submitted by prospective TCS Contractors.

The attached drawings, which are a part of the RFP, show the backbone cabling complements, station cable pull numbers, cable supporting systems, and termination details for all technology rooms.

The station cable routing schemes and outlet placements are as follows:

- In ceiling and stubbed down through hollow walls to wall boxes at 16" AFF in office;
- In ceiling and stubbed down through hollow walls to wall boxes at 48" AFF for wall mount telephones and 36" or 42" for counter top service locations;
- In ceiling to a ceiling mounted termination box e.g. for wireless access points and an intermediate cabling enclosure etc.;

This specification also defines the technical requirements that the selected, qualified telecommunications cabling contractor shall adhere to for all of Owner's voice and data telecommunications cabling work.

The design presented in this specification and the drawings is based on the products, including the parts numbers shown on the drawings and in the Bill of Materials (BOM), contained in the specifications. Contractors are to adhere to this product selection by the Owner.

Note: Product substitutions are not allowed unless authorized by the Owner or Owner's Consultant.

1.2 DOCUMENT ORGANIZATION

The remainder of this document is organized as follows:

- Section 2 provides relevant background on the building infrastructure;
- Section 3 details the scope of work to be performed by the Contractor;
- Section 4 provides general terms and conditions and job related guidelines to be adhered to on this project;
- Section 5 provides the detailed technical specifications for all cabling work including materials to be furnished and installed, workmanship standards and testing procedures to be employed, as well as the performance requirements to be achieved during and following the conduct of the job, and,
- The complete list of drawings is contained on the lead sheet to the drawing set, which is drawing DV0-00.

1.3 CABLING INSTALLATION AND TEST SCHEDULE

Contractor shall provide project schedule information, either elsewhere in the bid specifications package or upon the Owner's request.

1.4 CONTRACTOR QUALIFICATIONS

The Contractor shall be fully conversant and capable of the installation of large scale cabling systems supporting high-speed data and voice systems and be able to meet the following specific qualifications:

- Personnel trained and certified to install the specified cable system and qualify the installation for the issuance of the manufacturer's extended warranty;
- Demonstrable experience in installing these cabling systems;
- Experience in installation of cabling and termination systems tested as meeting EIA/TIA 568B.2 and related standards for Category 6A performance;
- At least three (3) installations, completed within the last 2 years, in excess of 1,000 Cat. 6A, RJ-45 station terminations;
- Certification in MMFO cable termination and connectorization; techniques/technologies;
- Personnel trained in the use of fiber optic OTDR, OLS and mechanical termination techniques;
- At least three (3) Contractor installations within the last two years supporting 1000 BaseT, 10000 BaseT Ethernet and other high speed LAN connectivity of at least 300 workstations.
- Personnel trained in the installation of backbone cable plant and experienced with cable support techniques, products and termination techniques.

Proof of comparable installations is required. The Contractor shall provide documentation and recent references including company, contact name, title, telephone number and a description of the project, attesting to its ability to satisfy the above requirements. Contractor shall document all installations and other projects that may conflict with this project, and list all on-going resource obligations.

1.5 JOB COORDINATION

Work specified under this Contract requires complete coordination with the Electrical and General Contractors on the construction site along with other contractors as well as the Owner's technology consultant and the owner's technology staff.

Contractor shall dedicate whatever time is reasonable in working with the appropriate Owner's representative or electrician to ensure coordination for the purpose of achieving the completed installation of the Telecommunication Cabling System as shown on the Contract Drawings.

END OF SECTION

2. TECHNICAL BACKGROUND

This section provides an overview of the work to be performed by the Contractor in order to furnish and install the TCS.

2.1 CABLING SYSTEM OVERVIEW

The TCS is governed by these specifications. A uniform station cabling system consisting of two (2) Cat. 6A station cables will be implemented at the facility. The Client uses an Ethernet LAN connection to support a data connection at the workstation. These cables will terminate on RJ-45 patch panels in the MDF/IDF closets and RJ-45 jacks and outlet plates at wall boxes and open plan furniture outlets. In addition to workstations and shared printer locations, a small number of locations will have one cable for wall phone and ceiling mounted Wi Fi antennas. The cable numbering scheme shown on the drawing at each outlet location identifies the station run type – either 1 or 2 cables and the location ID for a particular run. E.G., 02-045 equals a cable on the 2nd floor at station run to location 45.

Station cable jackets and termination jacks at outlet and on the panels in the IDF/MDF are to be color coded as follows:

Station Cable Sets

2 Cable Set - One (1) Blue (Data 1), and one (1) white (Data 2)

All Wi Fi cables - One (1) Blue (Data A)

All Wall Phone Cables - One (1) white (Data B)

The MDF/IDFs will house open relay racks for termination and patching of data station cables and installation of LAN/WAN switches and computer servers. All station cables will be terminated on Cat. 6A, 48 port, RJ-45 panels arranged on the rack(s) as shown on drawing DV4-01. The termination jacks mounted in the panel frames in the MDF/IDF and the outlet frames at the station end are to be color coded to match the cables, i.e. blue cables will have blue jacks at each end, white cables will have white jacks at each end, etc.

2.1.1 Copper Backbone

From the 1st floor MDF, one (1) Category 3, 100-pair cable shall be installed to each IDF.

These cables are to be routed up and down thru 3” conduits between floors, where it will be supported on the IDF ceiling ladder rack system then terminates on the termination block.

The 1st floor MDF/IDF is offset from all other closets on the floors above. IDF closets on 2nd, 3rd, 4th, 5th, and 6th floors at are all stacked one on top of the other.

2.1.2 Public Carrier Demarcation Service Delivery Cables

To be provided by public carriers

2.1.3 Data Backbone

The MDF will be connected to all IDFs by one (1) - 24 strands, Multi-Mode, Plenum Rated Armored Fiber Optic cable to each IDF. It shall be routed up and down thru the 3” conduits

between floors where it will be supported on the IDF ceiling ladder rack system until it reaches the termination enclosure within the racks as shown on the drawings.

The optical fiber cable shall terminate on both ends on the new LC/LC termination panel mounted in the rack mounted FO termination enclosure in each rack. The cable shall be in an assembly with performance standards and fire rating as specified by the part number shown in the Bill of Materials (BOM) in Section 5, Table 5.1 of the specifications. All *MMFO* terminations shall be made using LC connectors and shall be housed in the rack mountable enclosures specified in the BOM. The connectors on the cabling side of the Fiber Optic Connector Panels (FOCP) shall be single LC connectors to facilitate test and replacement of a single fiber. The connector on the backbone side of the Fiber Optic Connector Panels shall be a duplex LC connector of one-piece design construction.

2.1.4 Distribution Infrastructure

Station and backbone cable distribution within the facility is via Cat. 6A rated J-hooks, EMT conduit, pull boxes, sleeved and bushed cores through floor slabs and fire rated walls.

The cable tray system, which only runs in the ceiling over the racks in the MDF/IDF rooms will also be used to carry other non-TCS low voltage cabling such as for the Security and Access Control System, public carrier cables, etc.. The Contractor selected under this procurement will be expected to coordinate with these other contractors to manage an orderly placement scheme for cables on the tray system.

2.2 WORKSTATION CABLING

Workstations, offices, etc. and other cabled locations shall be cabled with the quantity and type of station cables specified in the drawings. Cables shall originate from a termination patch panel mounted on the cable rack in the MDF/IDF's to modular jacks installed in a wall plate or adapter plate that mount to an existing frame within the open plan furniture or on a single gang, multi-port outlet plate at the station. See 2.1 above for additional information.

2.3 TELECOMMUNICATION CLOSETS

Others shall fit out the IDF with fire-rated plywood backboards painted flat white, overhead lighting, electrical power feeds, ventilation or HVAC and locks. Additionally, the IDF will have security equipment and related cabling located within it. Care should be taken by the Contractor to protect these cables from damage in conducting its work. Any damage to these cables by the Contractor will be repaired by the Contractor at NO COST to the Owner.

2.4 RELAY RACKS

There shall be racks with associated horizontal and vertical wire management troughs. The Contractor is to install all racks, as well as the related vertical and horizontal cable troughs in all floor IDF rooms as shown on the drawings. Racks in the IDF Rooms are to be bolted to each other and secured to the overhead ladder rack system to conform the Seismic Zone 2 standard. The Contractor is to provide the overhead, Chatsworth style cable ladder as shown on the drawings. The overhead ladder rack will be secured to the walls to provide the required Seismic Zone 2 standard conformance for itself and the racks and cabinet frames.

2.5 OPEN PLAN FURNITURE CABLE IN-FEEDS AND WHIPS

Open plan furniture modules are being fed electrical power and telecomm cabling via wall or floor conduit penetrations. The Contractor shall provide properly sized Seal-Tite, Carlon or equal

whips and fittings and neatly bore the furniture base plates using a properly sized die and hydraulic port-a-punch at the specified entry points. Provide at least one (1) whip for every open plan workstation cluster with up to twelve (12) cables. No whip will have more than 12 Cat. 6A cables installed in it. For clusters with more than twelve (12) cables, provide additional whips as numerically appropriate. Contractor is to provide the necessary threaded fittings, washers, etc. to properly secure the whips at both the after set penetration location and the furniture base entry point.

2.6 CATV

A limited number of locations shall be cabled for HDTV.

These locations shall have one (1) RG-6U coaxial cable and one RJ-45 Ethernet. The RG-6U cable is for Cable TV service and the RJ-45 cable is for internet service to the TV. See the Bill of materials for the specifications of the coaxial cable to be used.

END OF SECTION

3. SCOPE OF WORK

The following is a summary of the work that the Contractor shall be required to perform. Section 5 describes the materials to be furnished and the manner in which they are to be installed and tested for the Owner.

3.1 CONTRACTOR RESPONSIBILITIES

The Scope of Work for the telecommunications cabling contractor shall be to furnish, install, terminate, test and warranty the following materials in accordance with the technical specifications, performance and installation requirements contained herein and in the drawings and others that may be applicable, which are available on site from the Owner, Architect and General Contractor (GC). This body of work constitutes the backbone and lateral/local distribution work for LAN and telephone connectivity.

The Contractor shall be responsible for the complete job to provide all the materials and labor to furnish, install, test and certify a complete and operational system, even if not explicitly specified herein.

3.1.1 Materials

- All backbone and lateral distribution cable (in accordance with the routes specified) including lateral cables to each workstation consisting of cables supporting the applications defined in Section 3.1 above and backbone cabling including multi-strand *MMFO* and multi pair copper cable for LAN, telephone and carrier trunk line connectivity, **and all specified cross-connect cables.**
- All workstation communications outlets (wall mount, flush mount, furniture and floor boxes) including connectors and faceplates.
- All modular jacks.
- All necessary connectors for cables entering the closets to facilitate termination on distribution panels.
- All mounting hardware and brackets.
- All termination blocks, panels and connectors to be mounted in IDF.
- All specified cabinets, racks, and relay frames to accommodate terminal blocks/panels and associated hardware in IDF and at the MDF.
- All cable trays as contained in the specifications and shown on the drawings including all related clips, hanger rods, braces, brackets and other hardware and tools required to properly install them per the manufacturer's specifications and code requirements.
- Copper and fiber optic patch cables in the IDF and MDF.
- All cable ladder, cable supports, Velcro wraps, D-rings, cable harnesses, J-Hooks, posts, inner duct and the like to assure structural integrity of the cable plant, neat and orderly installation, proper routing of cross connect jumpers and to allow cable to be terminated on blocks/panels.

- Fire stopping materials rated to the same or higher level as that of the material penetrated, and capable of simple and effective opening and resealing to accommodate changes.
- Tools and Test Equipment necessary to perform the acceptance tests specified in Section 5.4.
- Cable and termination labels affixed and marked in accordance with the requirements of Section 5.6.
- All mounting brackets, electrical boxes and conduit stub ups to house communications outlets as required (where not included in work performed by others).
- As-built drawing hard copy and also CAD files and detailed cable and cross connect records in hard copy and Excel spread sheets. CAD files shall be submitted in 2 hard copies and in AutoCAD and Visio files on a CD.

The Contractor shall be responsible for providing end-to-end connectivity from the workstation communications outlets to the punch down blocks or distribution panels in the MDF. In addition, the Contractor will provide all materials, tools and equipment even if not specifically identified herein to ensure a complete, reliable, safe and working system.

3.1.2 Labor

The Contractor shall provide the necessary personnel and services, with the required training and certification to ensure that the telecommunications cabling is installed to the highest standards of quality and workmanship and in conformance with applicable technical and manufacturers' standards, in a timely manner. Contractor personnel duties include but are not necessarily limited to the following on-site activities.

- Overall Project Management of the Contractor's effort
- Telecommunications Cable Installation, including:
 - As necessary, cable tray and ladder, j-hooks, cable grips, cable bridle rings, inner duct and after set installation to provide a complete path to run cables to designated locations;
 - Pulling cable from the closets to designated workstation locations and pulling backbone cable from floor to floor, through shaft ways, adhering to the cable routes specified in drawings and/or coordinated in advance with the Owner;
 - Terminating cable in outlets/connectors at the workstation;
 - Installing fiber optic cables, distribution panels, cabinets and racks to house concentrators;
 - Connectorizing fiber optic backbone cables and mounting them on distribution panels;
 - Mounting termination/distribution panels and blocks in IDF;
 - Installation of cabinets and racks as and where specified;
 - Installation of the voice Main Distribution Frame and termination of all backbone cables;
 - Terminating cables on high density wiring blocks and patch panels;
 - Labeling cables, racks, cabinets, termination and patching blocks, panels and outlets in accordance with these specifications;
- Installation of fire stopping materials in all penetrations through fire rated floors and walls in accordance with Article 300-21 of the NEC and all applicable City and State codes;
- Testing as specified in Section 5.

- Coordination and cooperation with other trades and with the General Contractor and other contractors.
- Monitoring and assurance of compliance with applicable codes and standards.

3.1.3 Documentation

The Contractor shall provide the following documentation in both hard copy and electronic file form in AutoCAD and Excel spreadsheet or Microsoft Access formats as applicable:

- As-built drawings for all components and subsystems installed by the Contractor. All drawings must be generated in AutoCAD. Owner's Consultant will provide the Contractor with all contract drawings in AutoCAD format as a basis for preparation by the Contractor of shop and as built drawings.
- Any requests for clarifications of specifications deviations or waivers from technical requirements, standards, and delivery schedules;
- Updates to contract drawings to as-built conditions, including cable routing, frame/cable labeling, cable termination schedules, closet layouts, etc. As necessary, the Contractor shall generate new drawings if updates reflecting field conditions are extensive. As-built documents are to be delivered 15 calendar days after cabling work for a floor or the backbone system has been accepted by the Owner.
- Manufacturers Test Reports for each reel of cable.
- Contractor/Pre-installation Test Results for each reel of fiber optic cable.
- Field Test Results (as per section 5) for each installed Cable pull including separate test results for Lateral and Backbone as well as results of full end-to-end tests after cross connector jumper cables are installed (where applicable).
- Written Certification that the Telecommunications Cable Plant has been correctly installed and tested in accordance with manufacturers' standards and technical standards such as NEC, ANSI, IEEE, and EIA/TIA 568B to Category 6A and MMFO or other standards as applicable.
- Documentation and Manuals describing the components and subsystems employed where applicable (e.g. component installation instructions).
- Manufacturer's extended warranty documents for the Cable System.

During implementation, the Owner and/or their representative, if necessary, will issue Construction Cable Pull Schedule drawings and associated numbering schemes reflecting any changes to the bid drawings. Alternatively, the Bid Drawings will become the Construction drawings by written directive from the Owner. The information in these documents will also be reflected in drawings issued for all voice and data cabling. The Contractor MUST conform cable installation to the information contained in these documents or obtain written approval for variations required by field conditions.

3.2 OUT-OF SCOPE WORK

This solicitation does not encompass the following items, which are out-of-scope.

- Fiber optic multiplexers/active LAN switches and other similar equipment.
- Infrastructure construction and installation except where indicated in the specifications.

3.3 WORK PERFORMED BY OTHERS

Others will provide the following items. However, in order to satisfactorily perform the work, the Contractor shall use the items listed below which are furnished and installed by others.

Within the IDF and on floor, the Owner will provide:

- Dedicated and convenience electrical outlets and power feeds (as indicated on drawings).
- Light fixtures.
- Room Lighting to facilitate the conduct of the work.
- Conduit stubs and double gang outlet boxes at lateral cable outlet locations indicated on the drawings.
- Sleeved and bushed horizontal and vertical cores and conduit for backbone and lateral cables.
- Plywood Backboard
- HVAC systems.
- Cabling for Fire Management and Energy Management Systems. Where these systems utilize portions of the Backbone or Lateral cabling installed by the Contractor under this procurement, the Contractor is responsible for assisting the contractors for these systems in making the cross connects or patches to the Backbone or lateral cabling installed and terminated by the Contractor.

The Owner will be responsible for all structural alterations (e.g. wall/shaft openings, and core drilling and sleeves) to facilitate the Contractor's work, except for cable tray system penetrations, which are the responsibility of the Contractor.

END OF SECTION

4. GENERAL REQUIREMENTS

This Section describes the general responsibilities of the Contractor in responding to the Request for Bid and/or in implementing the Cable System.

4.1 CONFIDENTIALITY

The Contractors shall not publicly identify or comment upon the contents of this specification without prior written permission.

4.2 CLARIFICATIONS

All requests for clarifications, RFIs, etc. should be submitted in the specified manner. No calls will be accepted.

4.3 SCHEDULE ADHERENCE

The Contractor shall adhere to the construction schedule as defined in Section 1.3 and/or as modified by the GC.

4.4 SUBSTITUTIONS, DEVIATIONS OR WAIVERS

Unless otherwise noted in this specification (i.e. by using the terms such as "or approved equivalent"), **substitutions are not allowed to be made by the Contractor**. Any substitutions, even where permitted, must be approved in advance by Owner's Consultant.

If the Contractor, for whatever reasons, desires to deviate from the specifications contained herein, a written request for change shall be submitted to Owner's Consultant and the Owner directly. Any deviations or substitutions from the specifications contained herein are not authorized unless explicitly approved in writing by the Owner based on Owner's Consultant's recommendation to approve it.

4.5 DISCREPANCIES/VALIDATION

The Contractor shall be responsible for bringing to the attention of the Owner and Owner's Consultant, any discrepancies between the specifications, drawings and/or installation procedures.

The Contractor is responsible for independently estimating and/or validating all quantities provided herein. The price that the Contractor proposes shall be based solely upon the Contractor's independent estimate. Any quantity information contained in these specifications is provided solely as a convenience and does not release the Contractor from its obligation to independently perform its own take-offs and calculations in preparing its Bid.

4.6 COMPLIANCE AND EXCEPTIONS

The Contractor shall explicitly state exceptions to the specifications, guidelines and requirements contained in this document. In the absence of such explicit exceptions, the Contractor accepts all requirements and conditions within the specifications.

4.7 INSURANCE

As required by the Client and the building owners.

4.8 TITLE & RISK OF LOSS

Title to the equipment and cabling shall pass to the Owner on the date of Final Acceptance by the Owner. Any loss or damage to the equipment or cabling prior to the passing of Title shall be the sole risk of the Contractor.

4.9 PROJECT TEAM

The Contractor shall provide a full project management team suitably qualified to discharge the Contractor's responsibilities. The Contractor shall assign a Project Manager (PM). The PM shall have full authority to represent the Contractor and will serve as the principal contact for resolution of problems and job coordination. The Project Manager (PM) shall be fully responsible for the coordination of materials handling to ensure materials are ordered on time, delivery times, etc. The PM shall ensure that the proper tooling is on site to facilitate the daily working objective. The PM shall be fully responsible for the crew sizing and possess the authority to increase or change the crew and its skill levels to facilitate a timely completion of this project. The PM shall be required to attend all job meetings either on or off site. The PM shall always be in a position to give updates on job status.

The PM shall be required to visit the job site regularly and perform thorough walk-throughs of the work being performed as well as planning for future work.

The Contractor shall assign a qualified foreman, who will be in charge of the work at all times. The foreman shall be on site whenever any employee of the Contractor is on site. Such foreman shall be replaced immediately if unsatisfactory to the Owner.

The Contractor shall provide an order of escalation chart complete with names and office and mobile phone numbers of all supervisory personnel within its organization associated with this project, including senior management.

The Contractor shall provide a project team organization chart and the resumes and credentials of the PM, foreman and senior technician(s) as part of this Bid submission.

The PM shall be subject to the approval of the Owner and Owner's Consultant.

The Contractor shall provide only skilled, experienced, and reliable craft people trained and certified in the installation of the TCS under the applicable standards required by the specifications stated in the RFP. Craft personnel are required to provide and use the manufacturer's recommended tools in the performance of such activities. Craft personnel shall also be experienced in the following communications activities:

- Premises cable communications systems (pulling, splicing, cross-connecting, testing, and termination).
- Copper and fiber optic cable installation and testing.
- Installation of racks and cabinets.
- Installing cross connects and patch cables including proper dressing of these cables.
- Fire stopping techniques
- Bonding and grounding of cable trays, racks, cabinets, shields and conduit.
- Cable support installation and securing.
- Industry and manufacturer's installation practices and procedures.

4.10 ABILITY TO PERFORM

The Contractor shall provide a listing of all projects that will be active at the time this project and outline its ability to perform in light of pre-existing commitments.

The Contractor shall provide, for work performed within the last two (2) years, a listing of at least three (3) references for previously completed projects as detailed in Section 1.4, along with the names and telephone numbers of client contacts responsible for these projects. These references will be contacted to provide reference checks.

4.11 LABOR HARMONY

All Contractor personnel will observe rules and procedures established by the Owner and the GC specific to the job site. The Contractor must ensure labor harmony between its craft personnel and the personnel of other contractors working on the project.

Contractor personnel shall cooperate at all times with other trades on the job site to preclude work stoppages, lost time and interference.

The Contractor shall coordinate at all times with the GC and shall be directed by the GC's schedule and directives in performing the Work.

4.12 FIELD COORDINATION AND COOPERATION

The Contractor shall be responsible for coordination with the work of other trades in the field. The items to be coordinated include, but are not limited to:

- Power, Lighting and HVAC in MDF, IDF and related rooms;
- Temporary light and power to facilitate the conduct of work (as required);
- Field cuts or penetrations to facilitate cable access/egress;
- Installation of poke-thru, cable tray, and stub-ups;
- Timing of installation work to accommodate the Owner personnel occupying the area.

Specifically the Contractor shall carefully coordinate his activities with those of the Telephone System, LAN, AV and Security systems contractors to assure an orderly installation and provide end-to-end connectivity.

The Contractor shall protect all backbone and lateral cabling from damage while other trade work is in progress.

The Contractor to verify with the GC the responsibility for the placement of all waste/debris created as a result of the work performed in the containers provided on each floor by the GC as well as restoring the premises to original condition in the event of any damage caused by its actions. If the Contractor does not place waste and debris in the containers provided, the GC will perform the cleanup and charge back the Contractor for this work.

4.13 SUB-CONTRACTING

All materials shall be furnished and installed by the Contractor unless otherwise noted in this document. Sub-contracting of the primary work is not permitted except for specialized tasks that do not form the bulk of the work, but they cannot represent more than 10% of the value of the total Bid. All sub-contractors shall be identified in the Contractor's Bid and are subject to approval by Owner's Consultant and the Owner. The Contractor shall remain solely responsible for the satisfactory performance of all work in this document whether performed by the Contractor or its sub-contractor.

4.14 WORK-IN-PROGRESS REVIEWS

During the conduct of the work, the Owner and/or its duly authorized representative shall have the right to inspect the Contractor's work-in-progress. If the work is not proceeding in accordance with the specifications and requirements defined herein, the Owner may redirect work to other Contractors as it sees fit.

All submission of permits shall be within the dates set by the GC.

All submissions of "AS-BUILT" drawings must be completed within fifteen calendar days of job completion.

4.15 MATERIALS HANDLING

The Contractor shall coordinate with the GC for proper delivery, unloading, handling, protection and storage of materials to the job site. The Contractor shall coordinate the movement of materials within the facility under construction subsequent to delivery (such as hoisting of cable reels to the appropriate floor, deployment of winches, etc.) with the GC. All construction materials shall be delivered to the job in proper containers and stored in the tenant's work area. Materials must not be stored in public areas (i.e. freight lobbies and public corridors).

4.16 MATERIALS QUALITY ASSURANCE

The Contractor shall supply only materials and equipment for installation, which are new, free from defects, manufactured within six months prior to installation (unless otherwise noted), and meet or exceed the latest published specifications of the manufacturer. All parts shall be listed by Underwriters Laboratories (UL) or Edison Testing Laboratories (ETL) for the intended use and shall bear the UL® or ETL® label. In addition, all cables will be CMR or CMP rated as per the National Electrical Code (NEC) USA.

4.17 WARRANTY

The Contractor shall warrant that cabling system materials and installation shall be free from defects for the maximum amount of time authorized by the Manufacture. Example: twenty-five (25) years from Acceptance by the Owner. The warranty period varies depending on the current amount offered by the manufacture of the system installed. This warranty shall include quality of components, as well as workmanship and cover replacement labor as well materials.

4.18 CODE ADHERENCE

In the conduct of the Work, the Contractor shall adhere to the latest issue (as applicable) of the following codes and standards:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Electronic Industries Association (EIA)/Telecommunications Industry Association (TIA) and particularly Section 568B.2
- Federal Communications Commission (FCC)
- National Electrical Code (NEC)
- National Fire Protection Association (NFPA)
- National Electrical Manufacturers Association (NEMA)
- Underwriters Laboratories (UL)
- Edison Testing Laboratories (ETL)

- State of North Carolina and City of Wilmington

In the event of a conflict between standards, the Contractor shall adhere to the more stringent standard.

4.19 FIRE SAFETY

All fire exits shall be kept clear and accessible at all times. Fire extinguishers must be on the job at all times. A.B.C. type all-purpose extinguisher shall be used.

END OF SECTION

5. TECHNICAL REQUIREMENTS

This section presents the detailed technical specifications that govern all of the Contractor's cabling work.

5.1 BACKBONE CABLING PLANT

The Backbone Cabling Plant consists of the copper and fiber optic cables supporting voice, data and other systems telecommunications links that are routed within the facility to link IDF's to the MDF.

5.1.1 Copper Backbone Cabling Plant

The copper backbone cabling plant consists of One (1) - 100 pair Category 3 cable running from the MDF on the 1st floor to the IDF Rooms located on the 2nd, 3rd, 4th, 5th, & 6th floors. Each end of the 100 pair cable shall terminate on a 300 pair, 110 block

5.1.1.1 Distribution Frames

The Contractor is responsible for furnishing and installing the RJ-45 termination/patch panels and all hardware for installation and associated testing for distribution frames, connectors and the wiring on the back plane of the Patch Panels for the vertical backbone.

The contractor is responsible for all IDF cross connects and patching and any miscellaneous cross-connects or patching that may be required.

5.1.1.2 Splice Locations

No splicing of any cables is permitted on this project except where specified.

5.1.1.3 Telecommunications Closets

The Telecommunications Closet (IDF) and Main Distribution Frame (MDF) rooms are located on the floors where shown on the drawings. They shall be equipped by the General Contractor (GC) with white painted plywood, electrical outlets, HVAC, lighting, flooring and a ceiling as shown in the drawings.

5.1.2 Data Backbone Cabling Termination

The Contractor shall provide Fiber Termination and splicing shelf units and mount them on the Cable Racks in the IDF's and MDF. All fiber optic backbone cables shall be routed to the racks and dressed into the shelf units. The fiber backbone cables shall then be broken out into individual strands, terminated with the specified connectors, and mounted in the specified couplers located on the shelves. Spiral wrap shall be provided as needed to protect binder groups or fiber strands once FO backbone cables are opened for routing into shelf units. The contractor shall strictly adhere to all manufacturer's instructions and methods for the installation of all fiber optic termination equipment.

5.2 LATERAL/LOCAL DISTRIBUTION CABLING SYSTEM

5.2.1 Station Cabling

The station locations will be cabled with the type of cables specified in Section 2.1 and the Bill of Materials (BOM) at the locations and in the quantities shown on the drawings. Cable will satisfy the material specifications of Section 5.7. Voice and data copper cables shall all be 23 AWG, unshielded, highly twisted pair with low capacitance properties that is third party verified to EIA/TIA Category 6A standards.

Where cable is routed through the ceiling, it will be routed on the cable tray systems (MGD/IDF's only), also to be installed by the Contractor, and then on cable slings and J- hooks at least every 5 feet and establish orderly routing paths on the floor from the cable tray to the outlet location. Cable routing must adhere to the route and clearance specifications detailed in Section 5.3.14.

At the outlet location, a minimum of 10 feet of cable slack shall be coiled and secured in a figure eight pattern as specified by the EIA/TIA standards to maintain its performance characteristics and secured with tie wraps to provide for service repair and future office layout changes. Cable shall be labeled with machine printed, plastic coated wrap labels within 6 inches of the outlet or panel jack termination. Terminate the conductor pairs, maintaining the existing pair twist to within .125" of the IDC termination pins, to the appropriate IDC pins at the data jack or termination panel. At the last J-hook or bridle ring and the stub up entry to the outlet box, cables should be secured to the J-hook or bridle ring with a Velcro tie wrap.

Once all the cables on a floor have been pulled, a Velcro wrap should be installed at each bridle ring or sling to secure the cable bundle routed through it. Voice and data cables should be bundled with Velcro wraps secured to rack's in the IDF's and the MDF. The cable bundles will be routed from their respective termination locations at the IDF's and MDF termination panels.

5.2.1.1 Voice Lateral Cable

Each cable set will contain one (1) white voice cable. They shall be terminated on the Cat. 6A, RJ-45 (White) jacks on the voice patch panels mounted on the 19" Racks, as shown on the drawings.

Wall phone locations will be equipped with a single gang telephone wall mount plate. The faceplates shall be stainless steel. In each case, the jacks and faceplates shall be electrically and mechanically integrated units. All plastic outlet components shall be of self-extinguishing thermoplastic or metallic construction.

5.2.1.2 Voice Cross-Connect in IDF

Cross-connects from the voice station cables to the telephone system will be made as follows: The client will be installing a new VOIP (voice over IP) telephone system. A patch cord will be patched from the voice port of the station cable patch panel to a port on the Ethernet switch to support voice services.

NOTE: Prior to any patching or cross-connect work, the Contractor shall have completed all components testing of backbone and station voice cabling except for end-to-end testing. End-to-end tests will be performed to verify that the cross-connect has been properly wired and that end-to-end signal quality meets specified standards.

5.2.2 Data Lateral Cables

Each standard location or workstation will be equipped with a complement of two (2) Data station cables except as noted in Section 2.1. The termination pin out standard for all station cables is 568B.

See drawings for outlet locations and IDs, and for faceplate details.

Section 5.7 details material specifications for all telecommunications outlets, blocks and panels addressed in this specification.

Throughout the space, outlets may be mounted in various configurations depending upon interior design consideration and cabling and telecommunication service requirements.

Standard wall outlets are mounted in the wall 16" AFF in a recessed duplex electrical gang box (4"L x 4"W x 2" deep) equipped with a single gang cover plate. Wall phone outlets will be mounted in a single gang faceplate mounted at 48".

All gang boxes, outlet boxes and floor monuments will be furnished and installed by others. Each outlet housed in a gang box, floor monument or outlet will be supplied with a drag line by them.

Properly located penetrations will be made by others where needed and are to be used by the Contractor to route the cables into the open plan furniture system. The Contractor is to provide a Seal-Tite, Carlon or equal whip and all required fittings for its installation between the wall box and the base plate of the furniture system and make an appropriate die punched circular penetration in the furniture system base plate to install the whip. Cables are to be routed through these whips. Within the modular furniture systems, the cables are to be routed to the outlet locations shown on the drawings where they will be terminated on jack/face plate assemblies of the proper specification to fit into the knock outs provided by the furniture manufacturer in the furniture systems cable delivery sub-system – either panel base kick plates or belt line – or installed in surface mount boxes as directed by the architect once the furniture system has been selected. If surface mount boxes are used, they are to be secured to the furniture system base plates with nuts, bolts and lock washers. Self-taping sheet metal screws are **NOT** to be used. Double sided tape or other adhesives are **NOT** to be used to secure these boxes. The Contractor is to die punch the furniture system base plate with a suitable opening or utilize one of the knock outs in the base plate provided by the furniture manufacturer to route the cable from the furniture system base to the surface mount outlet box.

5.2.3 Routing

Lateral cable distribution will be through ceiling spaces on the cable tray and J-hook system to be installed by the Contractor. The Contractor shall utilize Velcro, slings and j-hooks attached to the ceiling slab to support and secure the cable in the ceiling and/or under the raised floor to the point of entry to the location. When any cable is pulled to its respected location/back box, a drag line is to be left in place in the conduit or poke through to facilitate the installation of future cables. In concealed accessible ceiling areas, where groups of less than eighteen cables are routed, Cat. 6A rated J-hooks or bridle rings may be used.

Telecommunications cables on a floor will all terminate in the designated IDF or the MDF. The Contractor shall route all cables in such a manner as to protect them from sharp edges, right angle turns or areas where the cables would be subject to crush or flex. The Contractor shall provide a service loop of at least three (3) feet of slack in the cable dress on the racks at the IDF/MDF termination end of all station cables.

5.2.4 Route Preparation

Field coordination with the GC shall be required prior to initiating any work on the site.

As previously described, the Contractor will establish a primary station cable routing path on each section of the floor by installing the specified cable support infrastructure, from the local IDF. See **DVI/FE** drawings for routes. Exact locations will be coordinated in the field with the GC, the Architect and **DVI/FE**. The Contractor should closely adhere to the parameters specified in Section 5.3.14 for cable clearances from potential interfering equipment when establishing the primary routes.

The Contractor will install Relay Racks (RRs) or 4 post cabinet frames in the IDF/MDF rooms, configured as specified in Section 2.4 and the IDF/MDF layout drawings. The racks and cabinet

frames should be leveled, evened and bolted together along with their vertical cable dress troughs and bolted to the floor. RRs in each IDF and the MDF used to terminate station or backbone data cables must be permanently installed (i.e. bolted to the floor) before any cables can be routed into them and terminated.

The Contractor shall install overhead cable ladders within the IDF/MDF where shown on the drawings to route cables within the IDF.

5.2.5 Termination

The Contractor shall terminate 100% of all cables. All terminations of Copper and Fiber cable shall be made in identical manner with the tool recommended by the manufacturer of the HD blocks, termination panels and outlets.

Backbone cable shall be terminated contiguously on one HD block. Terminations shall be in color code sequence from left to right and from top to bottom on each block for each cable. Station cables shall be terminated in the IDF in numerical sequence starting with cable run number/pair number one (1) on the upper left hand side of the HD block. Every subsequent cable shall be terminated immediately adjacent and to the right of the previous. If there are not enough pins to completely terminate a cable on that row of pins, the cable shall be terminated on the next row and the extra pins in the original row shall remain spare.

Note: In order to maintain the electrical and data transmission characteristics of copper cables, the following practices must be observed during the termination of all copper cabling.

- Only remove the minimum amount of cable sheath necessary to properly terminate the wires.
- Cable conductors are arranged in pairs. Each pair has a specific twist associated with that pair. Maintain the pair twist at all times. Separate the conductors in a pair only as much as absolutely necessary to terminate the cable onto the connector. For data Category 6A cables the maximum untwisted length is .125".
- Never remove insulation from the conductors. All of the terminations in this project shall be of the insulation displacement (IDC).
- Leave the minimum amount of conductor after termination in an IDC connector. If necessary, use a cable scissors to trim extra length. In no circumstances shall the excess length exceed .125 inches above the terminator block face edge.

Fiber strands shall be field terminated on the specified connectors according to the specifications of the manufacturer. Only tool kits and consumables that are specified by the manufacturer shall be utilized. Completed connectors shall be placed into the sleeve of the fiber shelf by column and row as specified in the pull schedule provided by Owner's Consultant. Strands shall be protected and secured within the fiber shelf and the outlet location as specified by the manufacturer to ensure both strain relief and bend radius remain within spec. The fiber cable jacket shall be Velcro wrapped or secured with a cam block or other means provided with the shelf at the point of entry of the shelf to prevent strain on the strands. Where required to secure the fiber optic cable from pulling tension, the Kevlar strength members shall be separated from the fiber strands and attached to the panel by a clamp.

5.3 INSTALLATION

The Contractor shall observe the following guidelines in the course of the cable system installation activities. This installation is within space that is under construction. All work shall be done at such time as the GC shall deem appropriate. Work shall not begin in any area without specific notification of and approval by the GC.

5.3.1 Site Survey

Prior to placing any cable tray, feeder, station or backbone cable, the Contractor shall survey the site to see that job conditions do not impose any obstructions that would interfere with the safe and satisfactory placement of the cables, and arrange to remove any obstructions with the GC accordingly.

5.3.2 Physical Installation

The Contractor shall install all provided and furnished materials in accordance with manufacturer's specifications, recommendations and guidelines. Copies of the manufacturers' guidelines, specifications and recommendation and these specifications and the drawings shall be provided by the Contractor to the Owner representative and shall be made available on site to the Contractor's personnel.

5.3.3 Backbone Cable Placement

Subject to field conditions and in coordination with the GC, backbone cables are to be supported during vertical pulling and every three (3) feet after placement by securing them to the vertical cable ladder (installed by Contractor) or backboard (provided by others) in each IDF or MDF for this purpose. If a winch or other mechanical aid is used to pull cable, it must be equipped with an adjustable clutch, which must be set at a release tension, which is 90% of the rated maximum pull tension of the cables.

5.3.4 Backbone Cable Route Preparation and Support

The Contractor shall install backbone cabling in such manner as to fully support each vertical portion of the cable at a minimum of every three- (3) feet. One or more of the following shall provide as the support method:

- cable grips that are mounted to the building structure by an eyehook;
- by crossbeams installed at the direction and approval of Owner's Consultant;
- by the use of cable clamps at the floor sleeve; or
- Velcro wraps secured to backbone backboards or vertical cable ladders.

Each cable type shall use a cable grip appropriate to the cable to be supported. No damage to the cable sheath shall be permitted. Special care must be taken to ensure that the cable bend radius and pulling tension, both during and after installation, shall not exceed 90% of the manufacturers' recommendation.

Once all backbone cables have been placed, all conduits, sleeves, and other passageways for the carrying of backbone cables shall be fire stopped with an approved fire-retardant method at each fire barrier penetration. Unused conduits, sleeves, etc., shall also be sealed. Threaded metal caps may be utilized, as per applicable codes, to close-off unused conduits and/or sleeves.

5.3.5 Inspection

The cable shall be inspected as it is pulled off the reel for any obvious defects. If defects are observed, further use of the cable from this reel will be halted pending a determination of the reel's quality.

5.3.6 Pulling Tension

No cable shall be installed with a pulling tension exceeding the maximum recommended by the manufacturer. As necessary, pulling tension should be monitored with a tension gauge to ensure the maximum tension rating is not exceeded.

If multiple cables are to be pulled at one time, the Contractor shall make the necessary allowances to back-off the pulling tension of the bundle.

5.3.7 Bend Radii

All cables shall be installed with a bend radius greater than that recommended by the manufacturer. As necessary, cable guides shall be used to maintain recommended bend radii during pulling. Cables shall be secured so as to maintain proper bend radius after initial installation.

5.3.8 Slack

The Contractor shall install sufficient slack prior to termination and patching to assure that the amount of permanent slack described below is available after completion of the installation.

Prior to cut down, the Contractor shall be required to leave slack for backbone cables to provide some degree of flexibility and for service rearrangement. All slack shall be neatly secured maintaining the bend radius. A service loop of 3 feet shall be provided in each IDF and at the MDF. Slack of 10 feet shall be provided at each workstation at the location delivery point in the ceiling. Above the termination locations, fiber optic cables shall have both cable slack of 3 feet and strand slack of 30-40 inches. The cable slack shall be neatly dressed within the rack or cabinet. The strand slack shall be carefully layered in and loosely secured in each fiber termination, or patch panel. Under no condition shall the outer sheath or individual strands of fiber be deformed by over tightening of tie wraps and securing hardware.

5.3.9 Tie Wraps

NO nylon or other plastic type tie wraps are permitted on this project. Only Velcro tie wraps may be used. Kellems grips are to be used to secure vertical backbone cables and provide strain relief.

5.3.10 Placing Cable in Conduit

The Contractor shall verify that any conduits to be employed are clear of obstructions. For fiber, inner duct will be placed in conduit that is also used for copper cables. No inner duct is to be installed for fiber optic cables where they run in floor ducts or for any armored fiber optic cables.

A fish line and mandrel shall be used to clear the conduit of obstructions and as a guide for pulling the cable through. A nylon drag line of appropriate size shall be left behind in each conduit route so that future cables may be pulled in that conduit.

Conduit and sleeve bushings shall be used to protect the cable and sleeves jacket from abrasion as it is pulled through conduit. Since all conduits on the job are provided by others these bushings should be in place. The Contractor is to notify the GC of any missing bushings and is to halt pulling that cable segment until bushings are installed.

Pull boxes will be installed by others, as required based upon on-site conditions. Pull boxes will be installed along the path when an additional bend in the conduit would result in more than 180 degrees aggregate bend between pull boxes. Pull boxes will be sized to accommodate the number of cables and bends required. Cable support grips or brackets shall be placed in pull boxes by the Contractor so as to fully support the cable between the pull box and the next lower cable support.

5.3.11 Lubrication

As necessary, for cable pulls in conduit, the Contractor shall use only an approved "dry" lubricant compatible with the cable's outer jacket material.

5.3.12 Securing Methods

The Contractor shall provide Velcro tie wraps, backbone cable support grips and strain relief based upon field conditions to maintain orderly cable organization and proper loading and strain relief. The backbone cable shall require support to prevent cable attenuation and physical stress. The contractor shall secure the backbone cable as described in Section 5.3.3.

The Contractor shall be responsible for securing all cabling in a way to satisfy any structural engineering requirements (wall/floor supports, fastening, etc.). A safety factor of at least 3 shall be employed.

The Contractor shall obtain required structural engineering for any item that impacts the structural elements of the building and submit plans for relevant work to the GC for prior review and approval by the Structural Engineer.

5.3.13 Protection

During installation, and prior to final acceptance, the Contractor shall protect finished and unfinished work against damage and loss. In the event of such damage or loss, the Contractor shall replace or repair such work at no additional cost to the Owner. As cable is installed, care must be taken to avoid nicks, kinks or other damage to the cable. Provide strain relief at each termination point.

5.3.14 Cable Routes and Clearances

The Contractor shall "home-run" all cables between the identified termination blocks, panels and connectors in accordance with the route specified on the appropriate drawing. No intermediate splices or bridge points are permitted except where specified.

All station/local distribution cables shall be "home run" to the assigned IDF/MDF. No intermediate splices or bridge points are permitted.

Contractor shall not deviate from cable paths specified to the extent that field conditions permit.

Unshielded twisted pair copper cable shall be routed so as to maintain the following minimum distances from power sources:

- 5 inches from power lines of 2 KVA or less
- 12 inches from high voltage lighting (including fluorescent)
- 36 inches from power lines of 5 KVA or greater
- 40 inches from transformers and motors

Copper data cable station runs shall be laid out on the floor to ensure that they **do not** exceed a total run length of 290 feet excluding station stub down, rack dress and slack allowances.

5.3.15 Backbone Cable Termination

The Contractor shall terminate the copper backbone cables on High Density 300 pair, 110 blocks MDF/IDF's. All pairs in all cables shall be terminated contiguously in color-coded sequence. Copper cables shall be dressed neatly and Velcro wrapped in groups to prevent cable from being stressed at its termination points. Refer to the drawings for details.

The fiber optic cable shall be terminated where shown in the drawings in rack mounted fiber patch shelves utilizing the specified connectors. All fiber shall be installed as recommended by the manufacturer of the fiber and shall be terminated as recommended by the manufacturer of the specified connectors. Strain relief fittings and attachments are required for fiber optic cables.

5.3.16 Workstation Termination

The Contractor shall terminate station cables at the workstation outlet connector in accordance with the floor plans. Any changes to the plans shall be determined by a site survey and with the prior approval of the Owner.

Workstation and wireless LAN cables shall be terminated in the IDF's/MDF on the back of a 19" rack mounted termination panel that is equipped with RJ-45 Cat. 6A insert for copper or an FO shelf enclosure assembly and LC connectors for Fiber.

Station cables shall terminate in modular outlet assemblies at the workstation outlets. Cable shall route to the outlet via cable tray and j-hooks, and route to an electrical double gang box or through flex whips into the modular furniture base raceway to the termination point. Leave 6" slack within the gang box to permit the repair/replacement of the outlets. Apply the specified cable wrap label on each cable as it is terminated. Jack faceplate cable labels should be installed for each cable when testing of that station is successfully completed.

5.3.17 Grounding

In the MDF/IDF, others will provide a suitable reference ground point. In general, a complete connection to ground shall be formed from each structural metallic part of the cable plant to and through all others that parallel the route that a signal is designed to travel. In addition, all relay racks, cabinet frames, Patch panels, and cable tray provided by the Contractor are to be grounded and bonded per EIA/TIA Standards for Cat 6A installations, as applicable, for performance and safety. Refer to the drawings for the location of the ground bus bars located within the IDF/MDF rooms on each floor.

5.3.18 Splicing

No splicing of any cables is permitted on this project, except where specified.

5.3.19 Materials Management

In coordination with the Owner's duly authorized representative, the Contractor shall maintain and update as necessary materials lists, packing slips and invoices documenting the materials consumed during the conduct of the job, including:

- patch/termination panels
- connectors
- lineal feet of station and backbone cable
- cable tray
- racks and cabinets
- jacks and outlet assemblies

The Contractor shall allow for independent verification of quantities deployed during the work. The Contractor shall verify and validate for the Owner or its authorized representatives' inspection that the quantities of materials ordered are actually delivered (e.g., cable reels are "full").

In pulling and cutting down cable for terminations, the Contractor shall minimize unnecessary waste of cable, and efficiently utilize the quantities furnished on reels.

5.3.20 Workmanship

Workmanship will be to the highest standards in the telecommunications industry; all equipment and materials to be installed in a neat and secure manner in accordance with applicable industry technical standards, local code standards and product manufacturer's standards for their installation.

5.3.21 Fire Protection

The contractor shall use rated CMP labeled cables in accordance with USA NEC and applicable local codes for this project. Contractor shall fire stop all slot penetrations opening and conduits used to route cables through fire rated walls and floor slabs. A fire rated putty that remains pliable and can be removed shall be used to fire stop conduits and deck slab sleeves. Fire stop bags should be used to seal penetrations for cable trays. Fire stopping of station cable stub ups is not required.

5.4 TESTING

5.4.1 General

The Contractor shall thoroughly test all cables and connectors that they furnish and install. Successful completion of all tests indicated below is required for the Owner's acceptance of the system.

All backbone and station cabling must be thoroughly tested. The Owner will accept the backbone cabling for a given floor only after each floor is tested in accordance with these specifications. The Owner requires certification that all pairs were tested and found to be 100% reliable end-to-end (block to block); bad pairs, punch-downs and terminations shall not be abandoned, but rather be corrected and/or replaced at no additional cost to the Owner.

5.4.2 Testing Procedures

The Contractor shall provide the necessary test equipment to conduct the tests as outlined below. The use of automated test equipment is strongly encouraged to facilitate rapid, efficient and comprehensive testing as well as create an audit trail of the tests performed.

If requested by the owner, field tests shall be performed in the presence of the Owner's personnel and/or its duly authorized representatives.

The Contractor shall provide electronic documentation reporting the details and results of all tests on each station cable and fiber optic backbone cable.

5.4.3 Replacement

Any cable, connector, block or panel that tests below manufacturer's standards shall be replaced at no additional cost. The replacement shall be re-tested to verify compliance.

5.4.4 Pre-Installation Testing

The Contractor shall obtain factory test data for each reel of cable including, but not limited to:

- Physical Production Tests (tensile strength); and,
- Production Transmission Tests.

5.4.5 Post Installation Testing

Following the physical installation of the cables terminated at the closets, the Contractor shall conduct any pre-checkout tests deemed necessary prior to the conduct of formal technical testing. For Fiber Optic Cable refer to Section 5.4.6.3 for requirements.

5.4.6 Acceptance Testing

The Contractor shall perform the tests and inspections described in this section. Each floor and closet shall be tested individually and accepted on a per floor basis. The cabling system shall be inspected and tested for compliance with the specifications for physical placement, electrical specifications, wiring accuracy, continuity, and proper labeling and identification.

5.4.6.1 Physical Inspection

Prior to the conduct of any transmission testing, the following visual inspections shall be performed:

- Verify that cable has been installed to comply with contract documents;
- Check for physical damage to Distribution Panels and Termination Blocks;
- Verify that workstation outlets have been securely mounted and properly labeled;
- Check that all cabling is properly jacketed, installed and labeled at both ends;
- Verify that all cable bends are within the manufacturer's minimum bend radius allowed;
- Check and demonstrate that all cable shields have been correctly grounded or bonded;
- Verify that the cable is properly supported for termination and long term placement;
- Verify that cables have been terminated properly both mechanically and as to proper color code sequence.

5.4.6.2 Transmission Tests

Electrical tests of copper cables shall be performed only with connectors installed and cables punched down. Following installation, each backbone and station cable shall be tested end-to-end from termination point to termination point via the appropriate jack or punch down on the termination block. 100% testing of all pairs on all cables is required. Manufacturer's standard test equipment shall be employed in addition to any special test gear required.

For copper backbone cables, the Contractor shall attach the test equipment in the MDF room from the punch-down/termination block and at the punch-down/termination block or distribution panel in the IDF.

The Contractor shall test each copper station and backbone cable per the standards established by the EIA/TIA, under the 568-B2 standard, and the manufacturer for Cat. 6A certification and warranty, as applicable. Also, provide the length of each cable as determined by an MTDR test. All pairs of each cable shall be electrically tested for:

- Continuity - the measured resistance value shall be recorded.
- Opens
- Ground Faults
- Correct Termination;
- The complete EIA/TIA specified suite of Cat. 6A tests using an appropriate test unit such as Fluke or approved equal.

The Contractor shall also check for and correct as necessary:

- Reversals (Correct Polarity)
- Splits
- Crosses

The Contractor shall create a punch list of bad pairs and re-terminate and, as necessary, replace any defective cables, connectors and/or panels. For any closet, if 2% or more of the backbone pairs test "bad", the Contractor shall retest the entire backbone and if tested 1% bad again, the cable backbone shall be replaced.

After installation and termination, all Cat. 6A cables shall be subjected to a full suite of tests as specified by the EIA/TIA 568 B.2 standard by use of a properly certified automated tester such as Fluke or equal. All test records are to be saved in the tester and periodically downloaded to a PC for permanent recording and delivery to the Owner.

5.4.6.3 Fiber Optic Testing

The Contractor shall be responsible to perform optical loss (attenuation) measurements using a certified OLS tester. The sequence and procedures are defined in the following sections. The Contractor shall document such items as the personnel involved in the testing, type of equipment utilized, equipment settings, the date tested, reel number (or cable ID when tested post-installation) and strand number. In the event a reel, cable or strand fails to meet the manufacturer's specifications at 850 nm & 1300 nm for multi-mode cable and 1310nm & 1550 nm for single mode cable, the reels will not be accepted and are not to be used for the installation. The Contractor shall be responsible to supply sufficient cable for the installation and to take whatever action is necessary to provide such cable at no additional cost to the Owner.

5.4.6.3.1 Pre-Installation Tests

Upon delivery of the fiber optic cable to the site the Contractor shall perform Optical Loss tests of all reels and fiber strands to ensure the cables are undamaged and meet the manufacturers test results. The procedure for the optical loss test requires the use of stable optical light sources of 850 nm & 1300 nm for multi-mode cable and 1310nm & 1550 nm for single mode cable, a power meter that can be tuned to these frequencies and a fiber patch cable of at least 2 meters. The Contractor shall establish the reference power (Pr) by measuring the attenuation at each frequency using the fiber patch cable. The attenuation of the cable strand under test is measured (Pm) using a temporary connection at each end. The fiber patch cable remains attached to the optical light source during the test. Attenuation is calculated by subtracting the measured power from the reference power (Pr - Pm). The resulting value may not exceed 3 dB plus 3.5 dB/Km @ 850 nm or 3 dB plus 1.3 dB/Km @ 1300 nm for cable that is still on the reel. These tests may be witnessed by the Owner's representative and must be certified in writing.

5.4.6.3.2 Post Installation Testing

Upon installation and termination of cable into the appropriate FO shelves the tests shall be repeated for each strand of each fiber optic cable installed. The resulting value for terminated cable strands may not exceed .75 dB plus 3.5 dB/Km @ 850 nm and .75 dB plus 1.2 dB/Km @ 1300 nm per mated pair. In the event that any strand fails to perform as specified and cannot be corrected by the "tuning" or replacement of the connector, an OTDR test shall be performed to locate the fault. In the event that the fault cannot be rectified by the replacement of a connector, the entire cable shall be replaced.

5.5 TRAINING

Following completion of the installation and acceptance of the entire cable plant by the Owner, the Contractor shall provide training/orientation in the design, layout, operation, troubleshooting and maintenance of the cabling plant for the Owner's designated personnel.

5.6 LABELING

Proper labeling is of extreme importance to the Owner and is considered an integral part of acceptance testing.

5.6.1 Cable Labels

All cables in the complex shall be labeled according to the following conventions. These labels will be used to uniquely identify each cable and no cables shall be left unlabeled.

5.6.1.1 Lateral Cables

All station cables, voice, data shall have machine printed, plastic coated wrap labels affixed to them at both ends within 6" of their termination point or jacket opening - whichever is more visible upon completion of the installation.

The wrap label numbers to be used are the pull numbers for the cables shown on the pull schedule drawings included in the bid package or issued for construction as directed by the Owner.

5.6.1.2 Copper Voice Backbone Cables

All Backbone cables shall be labeled at both ends. Cable labels will be placed around each cable 6 inches from termination or jacket opening, whichever is more visible, upon completion of installation. The labeling shall indicate the location of the opposite end.

5.6.1.3 Data Fiber Optic Backbone Cables

Fiber optic backbone cables shall be labeled with wrap labels on the outer jacket within 3" of their securing point at the panel at both ends.

5.6.2 Workstation Outlets

Each outlet Faceplate shall have a location label affixed to it by the Contractor. The location I.D. is per the job drawings and consists of a numerical outlet location. The individual modular jacks will be differentiated by color as shown in the BOM.

5.6.3 MDF (High Density Blocks)

Stenciled or machine printed identification on the designation strip of all High Density blocks and termination panels shall be used to designate the pair counts on the block and a unique block ID. The block ID shall consist of:

- A numeric designation indicating the first and last pair on each row on a block (e.g., 1 and 25, 26 and 50, etc.).

5.6.4 Station Termination Panels

The station cable terminations in the IDF are to be organized vertically by color for each station. Station locations run from right to left in groups of 24. Termination panels are to be labeled a suitable machine printed, plastic coated or protected label with the outlet location ID – 001, 002, 003, etc. above each station's vertical group of panel jacks

5.6.5 Fiber Optic Backbone Panels

Stenciled identification on the fiber optic distribution panels shall be used to designate the strands and a unique distribution panel ID. The ports on each shelf should be labeled.

The FO backbone and inter-rack tie cable termination shelves and each individual pair termination port shall also be labeled as specified.

5.6.6 Racks and Cabinets

All Racks and cabinets in the MDF/IDF are to be labeled with permanent adhesive, machine printed, plastic coated labels with letters and numbers 1.5" high. These labels should have a white background with black lettering.

5.7 MATERIAL SPECIFICATIONS

The materials to be furnished and installed are described below. See the BOM for the manufacturer and part number of each component to be provided for the installation. The Contractor shall perform estimated takeoffs from the drawings and indicate quantities included in the quoted prices. The Contractor may propose alternate manufacturers for any materials specified herein, where substitutions are permitted, in accordance with the procedures outlined in the BOM and provided that the proposed alternates conform to the required specifications as

certified by a qualified independent testing authority, i.e. UL or ETL. Substitutions must also maintain the integrity of the warranty to be issued by the primary cabling and component manufacturer(s) issuing the warranty for the installation.

5.7.1 Copper Backbone Cable

Copper, unshielded twisted pair shall be used for the voice backbone cable. It must at minimum meet or exceed the following requirements. The voice backbone cable shall meet all mechanical and electrical characteristics of Category 3 cable. All Voice Backbone cable shall be:

- 24 AWG pairs
- Wrapped in Binder Groups (Industry Standard PIC color code)
- UL Listed as CMP/MPP (Plenum rated)
- UL classified as per NEC Article 800 for Plenum applications
- Provided with a varying twist pattern of 4 to 12 twists/foot
- The cable shall be approved for and shall support 1000 BaseT transmissions

5.7.2 Fiber Optic Cable

The contractor shall supply fiber optic cable to each floor that possesses at least the number of working strands specified. This shall correspond to the number of guaranteed working fibers in the sheath, i.e., the total count does not include defective fibers. *The contractor shall furnish and install 50 micron multi-mode fiber optic backbone cables as specified in the BOM and on the drawings.*

All fiber optic cable sheaths shall be marked with code, cable length (at minimum 1 meter intervals) and manufacturer's run number. Fiber cables will possess suitable non-metallic strength members to facilitate installation.

Individual buffer jackets of the fiber optic cable shall be color coded in accordance with EIA Standard 454. The cable shall conform to the EIA RS-455 standard for mechanical and environmental tests.

Fiber strands shall be continuous with no intermediate splices. The cable shall be rated for vertical and horizontal applications and shall be plenum rated. Both armored and non-armored jacket FO cables, as specified on the drawings, shall be supplied for this project

5.7.3 Voice – Unshielded Twisted Pair Lateral

Voice station cables will be four pair, UTP, plenum rated cables, manufacturer and part number as per the BOM.

Cable consists of 4 pairs of solid annealed copper 24 AWG conductors insulated with a plenum rated outer jacket. The cable shall be U.L. Listed as type CMP. The cable shall meet the requirements of EIA/TIA-568B for Category 6A cabling.

The cable shall be approved for and shall support 1000 BaseT transmissions.

5.7.4 Data – Unshielded Twisted Pair Lateral

Data station cables will be four pair, UTP, plenum rated cables, manufacturer and part number as per the BOM.

Cable consists of 4 pairs of solid annealed copper 23 AWG conductors insulated with a plenum rated outer jacket. The cable shall be U.L. Listed as type CMP. The cable shall meet the requirements of EIA/TIA-568B for Category 6A cabling.

The cable shall be approved for and shall support 1000 BaseT transmissions.

5.7.5 Fiber Optic Connectors

All strands of fiber optic cable shall be field terminated with the LC connectors specified in the BOM.

5.7.6 Fiber Optic Patch Panel

The contractor shall furnish and install fiber optic patch panels as defined in the BOM. The units shall be secured in the racks and possess troughs, clamps and related accessories to provide cable strain relief and maintain the fiber's minimum bend radius.

5.7.7 Patch Cords

Two (2) types of patch cords will be used on the project – copper RJ-45 cords and FO 2 strand Multi-Mode Fiber Optic cords. Their respective specifications are below.

5.7.7.1 Copper Patch Cords

Patch cords are to be made from stranded copper wire covered with a colored PVC jacket, terminated on each end with male RJ-45, Cat. 6A connectors and with “snag” protectors on the jack release levers. The cords are to be factory assembled, tested, certified, warranted and shipped in sealed plastic bags with factory labeling.

The part numbers shown for the white patch cords are for unit pricing purposes. In the actual installation the Contractor is to provide the correct color patch cords in the proper lengths to achieve a neat and clean patch dress on the racks, without any excess slack. At the station end all cords shall be assumed to be 10 ft. long for pricing purposes. The Contractor is also to make the following additional assumptions in order to provide a price for the work:

- *All 2 cable station locations (Blue & White) – The one (1) Blue and one (1) White jacks will be patched at both ends, i.e. a total of 2 Blue & 2 White patch cords per required per workstation connection.*
- *Patch cord lengths at workstation to be specified by the client. (2 per workstation, white/Blue)*
- *Patch cord lengths required in the MDF/IDF shall be coordinated with the client depending on placement of active equipment in the MDF/IDF's. (2 per workstation, Blue/White).*
- *All single cable runs (wall phones or WiFi) – one patch cord at each end, either Blue or White.*

5.7.7.2 Fiber Optic Patch Cords

All patch cords will be 2 strands LC/LC. There will be total of 20 patch cords, 2 per IDF room (10 patch cords) & 10 patch cords for the MDF.

5.7.8 Cross Connect Wire

The Cross Connect Wire to be used for all cross connections shall be Cat. 5E or better rated and shall have solid annealed copper conductors, individually insulated with PVC. The insulation should be marked at regular intervals with an additional code for color. The physical specification is 24 AWG Gauge, 1, 2, 3, or 4-pair as appropriate based on the specified cross connects.

5.7.9 Cable Tray

The Contractor will provide cable tray and J-Hooks on the routes and in the dimensions (width and height) shown on the drawings and per the part numbers in the BOM. In addition, the Contractor will provide Cat. 6A rated J-Hooks as specified in Section 5.2.3. The cable tray and J-Hooks must be installed utilizing the accessory parts, hardware and tooling specified by the manufacturer. Cuts, bends, intersections and other assemblies must be made and formed exactly as specified by the manufacturer. It is extremely important that the Contractor utilize the proper tooling during installation of the cable tray, since if the improper cutting tool is utilized, severe sharp edges are left behind and can harm any cables placed on the tray. The Contractor shall obtain all installation criteria from the manufacturer and arrange for on-site training of installation personnel by the manufacturer, if needed, prior to installation. The cable tray should be suspended from the ceiling structure either using two (2) threaded rods with rail clips at each suspension point, or using wall mount brackets. The center mounting techniques is not preferred and should only be used where the other methods cannot be utilized and only after receiving specific approval from Owner's Consultant. The mounting technique details are shown in the drawings.

5.7.10 Cable Ladder

Within the MDF/IDF, the Contractor shall install cable ladder as shown, as specified on the prints of those rooms/areas, and as required to safely route and support cable, within these areas. The Contractor shall install anchors, threaded rod, clamps and bars as needed to properly install and secure the tray. The cable tray in each IDF shall be grounded per NEC standards using the same ground as the Relay Racks. The cable ladder shall also be bolted securely to the relay racks and four post cabinet frames utilizing the manufacturer's appropriate accessory parts designed for this purpose in order to meet the seismic code requirements.

5.7.11 Station Data Outlets

The station location terminations will be made using the components as specified in Section 2.2 and the BOM.

Wall mount telephones will use an integrated telephone wall mount/cable termination plate as specified in Section 2.2 and the BOM.

Where a jack position is unused, a Blank Insert must be installed on any open jack positions in a terminations faceplate.

See the BOM for a listing of manufacturer's part numbers required for this project.

5.7.12 Station Cable Terminations

As per Section 2.2 and the BOM.

5.7.13 Cabinets

Cabinets and cabinet frames to house cable termination panels and electronic equipment shall conform to EIA Standard RS-310-B. Cabinet frames, panels and accessories as per Section 2.5 and the BOM are to be utilized. Appropriate floor slab or raised floor securing kits and overhead cable ladder attachment hardware available from the rack manufacturer and as specified on the drawings are to be used to properly secure all racks and comply with Seismic Zone 2 standards.

5.7.14 Relay Racks (RR)

Relay Racks to house data cable termination panels shall conform to EIA Standard RS-310-B. Racks and accessories as per Section 2.5 and the BOM are to be utilized. Appropriate slab or floor securing kits and overhead cable ladder attachment hardware available from the rack manufacturer are to be used to properly secure all racks and comply with Seismic Zone 2 standards.

5.7.15 CATV

A limited number of locations shall be cabled for HDTV. These locations shall have one (1) RG-6U coaxial cable and one RJ-45 Ethernet. The RG-6U cable is for Cable TV service and the RJ-45 cable is for internet service to the TV. See the Bill of materials for the specifications of the coaxial cable to be used.

5.7.16 Miscellaneous

Additional materials to be furnished and installed include:

- Backbone cabling supports (e.g., Kellems, building anchors, etc.), and grounding materials as required.
- Fire stopping to seal all penetrations of rated openings, both existing and created by the Contractor, through which any cable, installed by the Contractor passes. Fire stop shall be STI SpecSeal sealant, caulk, pillows or equivalent to provide a fire, smoke, and watertight seal. This seal shall remain soft and pliable to allow removal for addition of cables.
- Cross-connect tools and materials to terminate station and backbone cabling systems as described within this document.
- Distribution spools, Velcro tie wraps, harnesses, D-rings, and the like to assure a neat and orderly installation and allow cable to be terminated on blocks within each IDF, riser and station cable routes.
- Tools and test equipment necessary to perform the acceptance tests specified.
- Accessories and fittings for horizontal distribution station cables from the IDF to each workstation on the floor.
- Cable labels affixed and marked in accordance with the specifications.
- All electrical supplies and materials required by the National Electrical Code and local codes to provide a conforming installation of electrical power from the electrical outlets

to power strips. Junction boxes provided by others within the IDF into the Relay Racks located within each IDF.

END OF SECTION

TABLE 5.1: BILL OF MATERIALS

The following materials, with the part numbers shown as provided by the indicated manufacturers are approved for use on this project. The item quantities (where shown) are provided for the bidders convenience. However, the bidder is required to perform its own take-offs and counts and if any discrepancies are found, they must be brought to the Owner's Consultant attention by the bidder and resolved. No substitutions are permitted as described in at the end of Section 1.1 above.

Item	Quantity	Component	Manufacturer	Part No.
		<i>CABLES</i>		
		<i>Unshielded twisted pair (UTP) Station Cables</i>		
1	CTO*	10Gain XP Category 6A CMP, Blue	Superior Essex	6H-272-2B
2	CTO	10Gain XP Category 6A CMP, White	Superior Essex	6H-272-4B
3	CTO	Coax RG-6, Quad Shield, CM/CATV, CMP/CATVR and CMP/CL2P, Color White	Superior Essex	78-14C-91
		<i>Copper Backbone Riser Cable</i>		
4	CTO	100-Pair Category-3 CMP, Grey	Superior Essex	18-799-36
		<i>Fiber Backbone Riser Cables</i>		
5	CTO	24-Strand Multi-mode, Interlock Armored, Plenum, OFCP, TeraFlex Bend Resistant Laser Optimized 50/125, 10G/550	Superior Essex	L4024P401
		<i>Cross-Connect Cable</i>		
6	CTO	1 pair, 24 AWG, CCW-F Hook-up Wire	General Cable	2113054
		<i>CONNECTORS & MOUNTING PLATES</i>		
		<i>Flush Wall Mounted Standard Outlet</i>		
7	CTO	4-Port, Single Gang TracJack Faceplate	Ortronics	OR-40300546
8	CTO	Cat-6A RJ-45 Jack(s), T568B Wired for Data 1 (Blue)	Ortronics	OR-TJ6A-36
9	CTO	Cat-6A RJ-45 Jack(s), T568B Wired for Data 2 (White)	Ortronics	OR-TJ6A-88
	CTO	TracJack Module F Connector F/F (Fog White)	Ortronics	OR-63700006
10	CTO	Data 1, Icon(s), Blue	Ortronics	OR-40326200
11	CTO	Data 2, Icon(s), White	Ortronics	OR-40309200
12	CTO	TracJack Furniture Bezel, 4-port	Ortronics	OR-40300633**
		<i>Wireless Access Point Outlet</i>		
13	CTO	TracJack Surface Mount Box, 2-port	Ortronics	OR-404TJ2
14	CTO	Cat-6A RJ-45 Jack(s), T568B Wired for Data (Blue)	Ortronics	OR-TJ6A-36
15	CTO	TracJack Blank Module	Ortronics	OR-42100002

Item	Quantity	Component	Manufacturer	Part No.
16	CTO	Data Icon(s), Blue	Ortronics	OR-40326200
		<u>Wall Phone Outlet</u>		
17	CTO	Single Gang Stainless Steel Wall Phone Faceplate with Phone Studs	Ortronics	OR-403STJ1WP
		<u>TERMINATION HARDWARE</u>		
		<u>Copper Riser Termination Hardware</u>		
18	CTO	300-Pair 110-Type Blocks with 5-pair connecting clips	Ortronics	OR-30200022
19	CTO	110 Jumper Trough, with legs	Ortronics	OR-30200140
		<u>Data Termination Hardware</u>		
		<u>Fiber Connectors & Enclosure</u>		
20	CTO	2RU Fiber Enclosure	Ortronics	OR-FC02U-P
21	CTO	Fiber Adapter Panel with six (6) Quad LC (24 Fiber) Multi-mode Aqua Adapter with Ceramic Alignment Sleeves Connectors	Ortronics	OR-OFP-LCQ24LC
22	1	Fiber Adapter Panel with six (6) Quad LC (24 Fiber) Single-mode blue adapter with Ceramic Alignment Sleeves (For outside plant cable to Judicial Building)	Ortronics	OR-OFP-LCQ24AC
23	CTO	Lumen LC Connector, LC Reusable 50/125, Multi-mode , Aqua Housing	Ortronics	OR-205KAT9GA-50T
		<u>UTP Termination</u>		
24	CTO	Horizontal cable Management Panel, 2RU	Ortronics	OR-M6HMF2RUDWG
25	CTO	48-Port Category 6A Clarity UTP Patch Panel	Ortronics	OR-PHD6AU48
26	CTO	Component Labels for Patch Panels	Ortronics	OR-70400691
27	CTO	24-Port unloaded flat panel for Cable TV Coax. Cabling termination (F Connector modules required)	Ortronics	OR-PHDHJU24
28	CTO	F-connector Module, Black	Ortronics	OR-63700006-00
		<u>EQUIPMENT RACKS</u>		
29	7	MM20, 30" FIXED 4 POST RACK 7'H x 30"D x 45 RU	Ortronics	MM20730FXD12-x
30	7	MM20 VERTICAL CABLE MGMT CAGE W/DOOR	Ortronics	MM20VMD706
		<u>SUPPORT HARDWARE</u>		
31	CTO	18" Wide Ladder Rack	Chatsworth	10250-718
32	CTO	Cable Runway Radius Drop w. Cable Spools, Black, 18"	Chatsworth	12100-718

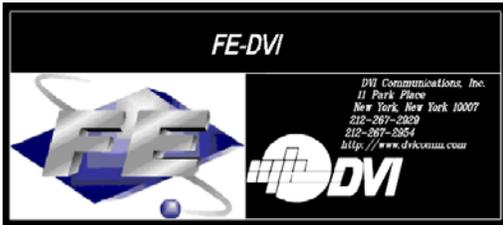
Item	Quantity	Component	Manufacturer	Part No.
33	CTO	Cable Runway Butt Splice Kit	Chatsworth	11301-001
34	CTO	3" Cable Runway to Rack Mounting Plate	Chatsworth	10595-7-18
35	CTO	Parallel Cable Runway to Cabinet Frame Mounting Plate	Chatsworth	12595-701
36	CTO	Junction-Splice Kit	Chatsworth	11302-001
37	CTO	Wall Angle Support Kit	Chatsworth	11421-718
38	CTO	End Closing Kit	Chatsworth	11700-718
		<i>Grounding of Racks, Cabinets, Ladder Racks, ETC.</i>		
39	CTO	Telecommunications Main Grounding Bar Kit (in MDF)	Ortronics	OR-GB4X12TMGBKIT
40	CTO	Telecommunications Grounding Bar Kit (in IDF Rooms)	Ortronics	OR-GB2X12TGBKIT
		<i>Patch Cords</i>		
		<i>Cat 6A For Workstation Outlets</i>		
41	CTO	7' Long Category 6A Clarity Patch Cord, T568B Wired, Blue	Ortronics	OR-MC6A07-06
42	CTO	7' Long Category 6A Clarity Patch Cord, T568B Wired, White	Ortronics	OR-MC6A07-09
		<i>Cat 6A For Patch Panels</i>		
		Contractor to provide an assortment of patch cords to terminate Data 1 and Data 2 port in each IDF room to the network server switch.		
43	CTO	5' Long Category 6A Clarity Patch Cord, T568B Wired, Blue	Ortronics	OR-MC6A05-06
44	CTO	5' Long Category 6A Clarity Patch Cord, T568B Wired, White	Ortronics	OR-MC6A05-09
45	CTO	7' Long Category 6A Clarity Patch Cord, T568B Wired, Blue	Ortronics	OR-MC6A07-06
46	CTO	7' Long Category 6A Clarity Patch Cord, T568B Wired, White	Ortronics	OR-MC6A07-09
47	CTO	9' Long Category 6A Clarity Patch Cord, T568B Wired, Blue	Ortronics	OR-MC6A09-06
48	CTO	9' Long Category 6A Clarity Patch Cord, T568B Wired, White	Ortronics	OR-MC6A09-09
49	CTO	15' Long Category 6A Clarity Patch Cord, T568B Wired, Blue	Ortronics	OR-MC6A15-06

Item	Quantity	Component	Manufacturer	Part No.
50	CTO	15' Long Category 6A Clarity Patch Cord, T568B Wired, White	Ortronics	OR-MC6A15-09
		<i>Multi-Mode Fiber Optic Patch Cord</i>		
51	20	SpaceSaver LC to LC, Duplex, multi-mode, 2m Long	Ortronics	OR-P3DF2LRGZGZ001M
		<i>MISCELLANEOUS ITEMS</i>		
		<i>Firestopping</i>		
52	CTO	SpecSeal sealant, caulk, pillows	Hilti	
		<i>Tie Wraps</i>		
53	CTO	Plenum rated Velcro Tie Wraps		
54	CTO	Spiral/Helical Cable Wrap	Seal-Tile, Carlson or equal	
		<i>Labeling</i>		
55	CTO	Labeling on Both Ends of All Cables		
56	CTO	Labeling on All Workstation Outlets		
57	CTO	Labeling on all Termination Patch Panels		
58	CTO	Labeling on all Termination Blocks		
		<i>UPS – Uninterruptible Power Supply</i>		
59	6	APC Smart-UPS, 2700 Watts /3000 VA, Input 208V /Output 208V, Interface Port USB, Rack Height 2 U	APC	SMT3000RMT2U
60	12	Rack PDU, Basic, Zero U, 15A, 100/120V, (14) 5-15 APC Basic Rack PDU, Input: 100V, 120V, Input Connections: NEMA 5-15P, Cord Length: 12 feet (3.66 meters), Output: 100V, 120V, Output Connections: NEMA 5-15R	APC	AP9567

* CTO = Contractor Take Off

** Contractor to verify Furniture Bezel Compatibility with Furniture system prior to purchase.

END OF SECTION



April 9, 2015

ADDENDUM 1 – Outside Plant - Optical Fiber Cable

PROJECT OVERVIEW

This document is issued as an Addendum to the Request for Bid (RFB) for the supply and installation of Telecommunications Cabling System (TCS) for New Hanover County (NHC), (referred to as the Client). The client is renovating space in the building located at 320 Chestnut Street, Wilmington, North Carolina. This renovated building shall be connected to the Judicial building located at 316 Princess Street, Wilmington, N.C. by a single-mode optical fiber cable. The new single-mode cable shall replace an existing cable that was damaged and needs to be replaced.

Installation of the new cable shall be via the identical pathway as the existing fiber cable. Pathways from the buildings to the street is via existing conduit entry points. Outside the building, the cable attaches to the street installed telephone poles and go from one pole to another until it reaches the other building.

The new single-mode optical fiber cable is designed for Aerial installation. The optical fiber cable shall have 24 fiber strands of single mode fiber with LC type connectors terminated on both ends.

The Judicial building side shall have a new optical fiber enclosure with a new 24-port LC insert module installed in the basement of the Judicial building in the electrical room. This fiber enclosure shall replace the existing enclosure that the old optical fiber cable was terminated in.

The NHC 320 Chestnut Street side shall terminate on the optical fiber enclosure that is installed at part of the renovation work of the TCS.

Refer to Bill of Materials (BOM) shown below for the materials that are required for this addendum.

Scope of Work

Please utilize this document to provide pricing for the work to be performed.

- Removal of existing single-mode optical fiber cable from all pathways.
(Old cable to be properly disposed of as per the directions of NHC.
Disposal method to be verified with the client.)
- Installation of One (1) new single-mode optical fiber cable between NHC and The Judicial building.
- Contractor responsible to procure all appropriate city permits required to perform the removal of the old and installation of the new single-mode optical fiber cable via the existing pathways.
- Contractor is responsible for the proper sealing of all exterior building conduits penetrations against water entry into the buildings.

- Installation of One (1) new optical fiber enclosure in the basement of the Judicial building.
- Terminate both end of the single-mode cable with LC type connectors.
- Install the LC type connectors into the fiber enclosures at both ends.
- Contractor shall properly test all fiber strands and provide client with complete test results. See Fiber Optic Testing below.
- Contractor shall properly identify both ends of the single-mode fiber optic cable.

Fiber Optic Testing

The Contractor shall be responsible to perform optical loss (attenuation) measurements using a certified OLS tester. The Contractor shall document such items as the personnel involved in the testing, type of equipment utilized, equipment settings, the date tested, reel number (or cable ID when tested post-installation) and strand number. In the event a reel, cable or strand fails to meet the manufacturer's specifications at 1310 nm & 1550 nm wavelengths for single mode cable, the reels will not be accepted and are not to be used for the installation. The Contractor shall be responsible to supply sufficient cable for the installation and to take whatever action is necessary to provide such cable at no additional cost to the Owner.

Pre-Installation Tests

Upon delivery of the fiber optic cable to the site the Contractor shall perform Optical Loss tests of all reels and fiber strands to insure the cables are undamaged and meet the manufacturers test results. The procedure for the optical loss test requires the use of stable optical light sources, a power meter that can be tuned to both frequencies and a fiber patch cable of at least 2 meters. The Contractor shall establish the reference power (P_r) by measuring the attenuation at each frequency using the fiber patch cable. The attenuation of the cable strand under test is measured (P_m) using a temporary LC connection at each end. The fiber patch cable remains attached to the optical light source during the test. Attenuation is calculated by subtracting the measured power from the reference power ($P_r - P_m$). The resulting value may not exceed the manufacturer's specification.

Post Installation Testing

Upon installation and termination of cable into the appropriate FO shelves, the tests shall be repeated for each strand of each fiber optic cable installed. The resulting value for terminated cable strands may not exceed the manufacturer's specification. In the event that any strand fails to perform as specified and cannot be corrected by the replacement of the connector, an OTDR test shall be performed to locate the fault. In the event that the fault cannot be rectified by the replacement of a connector, the entire cable shall be replaced.

Labeling

All labels shall be either machine printed or stenciled. No hand written labels will be accepted. All cables shall be labeled according to the conventions identified herein. These labels will be used to uniquely identify the cable pulled. No cables shall be left unlabeled. Unless otherwise noted, cables shall be labeled at fiber enclosure front, cable jacket 6"-12" from rear of fiber enclosure, and in each Handhold or pull box. Cable labels shall be self-laminating wrap-around type with the cable identifier printed on three (3) lines so that the label can be read from any angle, Labels shall be used to uniquely identify the cable pulled and its originating/terminating location.

TABLE 5.1: BILL OF MATERIALS

The following materials, with the part numbers shown as provided by the indicated manufacturers are approved for use on this project. The item quantities (where shown) are provided for the bidders convenience. However, the bidder is required to perform its own take-offs and counts and, if any discrepancies are found, they must be brought to the Owner’s Consultant’s attention by the bidder and resolved. No substitutions are permitted.

Item	Quantity	Component	Manufacturer	Part No.
		<u>Optical Fiber cable – Outside Plant</u>		
1	CTO	24-Strand Single-mode, Dri-Lite Single Jacket / Single Armor / Aerial Self Support with reduced water peak	Superior Essex	120243DM1
		<u>Fiber Connectors & Enclosure</u>		
2	1	2RU Fiber Enclosure (Judicial Building side only)	Ortronics	OR-FC02U-P
3	1	Fiber Adapter Panel with six (6) Quad LC (24 Fiber) Single-mode blue adapter with Ceramic Alignment Sleeves	Ortronics	OR-OFP-LCQ24AC
4	CTO	Blank Panel adapter (one for each unused fiber adapter panel opening)	Ortronics	OR-OFP-BLANK
5	48	LC Reusable Connector, Single-mode , Blue Housing, white 900 micron boot	Ortronics	OR-205KNT9SA-09

CTO= Contractor take off

NORTH CAROLINA

AGREEMENT

NEW HANOVER COUNTY

THIS CONTRACT made and entered into this _____ day of _____ 2015 by and between **NEW HANOVER COUNTY**, a political subdivision of the State of North Carolina, hereinafter referred to as "County"; and _____, hereinafter referred to as "Contractor."

WITNESSETH:

That the Contractor, for the consideration hereinafter fully set out, hereby agrees with the County as follows:

1. Scope of Services. Contractor shall provide labor and materials to install IT cabling and equipment for the 320 Chestnut Street Project as more fully described on Exhibit A, attached hereto and incorporated herein by reference.

2. Time of Performance. The term of this Agreement shall begin from Notice to Proceed and all work shall be completed within sixty (60) days

3. Payment. County hereby agrees to pay for the cost of this Contract not to exceed a sum of _____ (\$_____) Dollars. Payment is contingent upon a final County inspection and acceptance of work.

4. Extra Work. County and Contractor shall negotiate and agree upon the value of any extra work or services prior to the issuance of a County Change Order or Renewal/Amendment (CRA) form covering said extra work or services. Such Change Order or CRA shall set forth the corresponding adjustment, if any, to the Contract Price and Contract Time.

5. Indemnity. Contractor shall indemnify and hold County, its officers, officials, agents, and employees, harmless against any and all claims, demands, causes of action, or other liability, including attorney fees, on account of Contract or personal injuries or death or on account of property damages arising out of or relating to the work or services to be performed by Contractor hereunder, resulting from the negligence of or the willful act or omission of Contractor, its agents, employees and subcontractors.

6. Insurance. Before commencing any work or services, Contractor shall procure insurance in Contractor's name and maintain all insurance policies for the

duration of the Contract of the types and in the amounts listed in this Contract. The insurance shall provide coverage against claims for injuries to persons or damages to property which may arise from operations or in connection with the performance of the work hereunder by Contractor, its agents, representatives, employees, or subcontractors, whether such operations by itself or anyone directly or indirectly employed by it.

7. Minimum Scope and Limits of Insurance

7.1 Commercial General Liability

7.1.1 Contractor shall maintain Commercial General Liability (CGL) and if necessary, Commercial Umbrella Liability insurance with a total limit of not less than \$1,000,000 each occurrence for bodily injury and property damage. If such CGL insurance contains a general aggregate limit, it shall apply separately to this project/location or the general aggregate shall be twice the required limit.

7.1.2 CGL insurance shall be written on Insurance Services Office (ISO) "occurrence" form CG 00 01 covering CGL or its equivalent and shall cover the liability arising from premises, operations, independent Contractors, products-completed operations, personal and advertising injury, and liability assumed under an insured Contract, including the tort liability of another assumed in a business contract.

7.1.3 County, its officers, officials, agents, and employees are to be covered as additional insureds under the CGL by endorsement CG 20 26 or an endorsement providing equivalent coverage as respects to liability arising out of activities performed by or on behalf of Contractor; products and completed operations of Contractor; premises owned, leased or used by Contractor; and under the commercial umbrella, if any. The coverage shall contain no special limitations on the scope of protection afforded to County, its officers, officials, agents, and employees

7.1.4 Contractor's CGL insurance shall be primary as respects County, its officers, officials, agents, and employees. Any other insurance or self-insurance maintained by County, its officers, officials, agents, and employees shall be excess of and not contribute with Contractor's insurance.

7.2 Worker's Compensation and Employer's Liability

7.2.1 Contractor shall maintain Work or Worker's

Compensation as required by the General Statutes of the State of North Carolina and Employer's Liability Insurance.

7.2.2 The Employer's Liability, and if necessary, Commercial Umbrella Liability insurance shall not be less than \$1,000,000 each accident for bodily injury by accident, \$1,000,000 each employee for bodily injury by disease, and \$1,000,000 policy limit.

7.2.3 The insurer shall agree to waive all rights of subrogation against County, its officers, officials, agents, and employees for losses arising from work or services performed by Contractor for County.

7.3 Business Auto Liability

7.3.1 Contractor shall maintain Business or Personal Auto Liability and, if necessary, Commercial Umbrella Liability insurance with a limit of not less than \$1,000,000 each accident.

7.3.2 Such insurance shall cover liability arising out of any auto, including owned, hired, and non-owned autos.

7.3.3 Business Auto coverage shall be written on ISO form CA 00 01, or a substitute form providing equivalent liability coverage. If necessary, the policy shall be endorsed to provide Contractual liability coverage equivalent to that provided in ISO form CA 00 01.

7.3.4 Contractor's Business Auto Liability insurance shall be primary as respects County, its officers, officials, agents, and employees. Any other insurance or self-insurance maintained by County, its officers, officials, agents, and employees shall be excess of and not contribute with Contractor's insurance.

7.4 Installation Floater

7.4.1 Contractor shall purchase and maintain in force Installation Floater insurance for the installation of equipment. Such insurance shall be written in an amount equal to the replacement cost of the equipment. The insurance shall apply on a replacement cost basis. Insured property shall include portions of the work located away from the site but intended for use at the site, and shall also cover portions of the work in transit. Installation Floater insurance shall name County as loss payee. Installation Floater Insurance shall, at a minimum, cover the perils insured under

the ISO special causes of loss form (CP 10 30). If County is damaged by the failure of Contractor to maintain Installation Floater insurance, then Contractor shall bear all reasonable costs properly attributable to that failure.

7.5 Surety Bond

7.5.1 Contractor shall furnish and deliver to County a Payment Bond and a Performance Bond covering the faithful performance and completion of the work included in this Contract and payment for all materials and labor furnished or supplied in connection with the work included in this Contract.

7.5.2 Said bonds shall be issued and furnished to County prior to, and as a condition precedent to, commencement of the work of this Contract.

7.5.3 Each of the Payment Bond and Performance Bond shall be furnished on behalf of contractor, shall name County obligee, and shall be in the amount equal to one hundred (100%) percent of the amount of the guaranteed repair and maintenance costs. Such bond(s) shall be solely for the protection of County.

7.5.4 The Payment Bond and the Performance Bond shall be in the forms set forth as Exhibit "B" hereto, and shall be issued by a surety of financial standing having a rating from A.M. Best Company equal to or better than A and must be included on the approved list of sureties issued by the United States Department of Treasury.

7.5.5 The bond shall remain in effect at least one (1) year after the date when final payment becomes due.

7.5.6 The surety bond must be in the form set forth in NCGS 44A-33, without any variations therefrom.

7.5.7 Contractor shall provide surety bond wherein Surety waives notice of any and all modifications, omissions, additions, changes and advance payments or deferred payments in or about the Contract, and agrees that the obligations undertaken by the Bond shall not be impaired in any manner by reason of any such modifications, omissions, additions, changes, and advance payments or deferred payments.

7.5.8 The surety bond must set forth no requirement that suit be initiated prior to the time stipulated in applicable North Carolina Statutes of Limitation

7.6 Deductibles and Self-Insured Retentions

7.6.1 Any deductibles or self-insured retentions must be declared to and approved by County. At the option of County, either the insurer shall reduce or eliminate such deductibles or self-insured retentions as respects County, its officers, officials, agents, and employees; or Contractor shall procure a bond guaranteeing payment of deductibles or self-insured retentions.

7.6.2 Contractor shall be solely responsible for the payment of all deductibles to which such policies are subject, whether or not County is an insured under the policy.

7.7 Miscellaneous Insurance Provisions

7.7.1 The policies are to contain, or be endorsed to contain, the following provisions:

7.7.2 Any failure to comply with reporting provisions of the policies listed in this Contract shall not affect coverage provided to County its officers, officials, agents, and employees.

7.7.3 Each insurance policy required by this Contract shall be endorsed to state that coverage shall not be canceled by either party except after thirty (30) days prior written notice has been given to County, 230 Government Center Drive #125, Wilmington, NC 28403.

7.7.4 If Contractor's liability policies do not contain the standard ISO separation of insureds provision, or a substantially similar clause, they shall be endorsed to provide cross-liability coverage.

7.8 Acceptability of Insurers

7.8.1 Insurance is to be placed with insurers licensed to do business in the State of North Carolina with an A.M. Best's rating of no less than A VII unless County has granted specific approval.

7.8 Evidence of Insurance

7.9.1 Contractor shall furnish County with a certificate(s) of

insurance, executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements prior to commencing the work or services, and thereafter upon renewal or replacement of each certified coverage until all operations under this Contract are deemed complete.

7.9.2 Evidence of additional insured status shall be noted on the certificate of insurance as per requirements in this Contract.

7.9.3 With respect to insurance maintained after final payment in compliance with requirements, an additional certificate(s) evidencing such coverage shall be provided to County with final application for payment and thereafter upon renewal or replacement of such insurance until the expiration of the period for which such insurance must be maintained.

7.10 Sub-Contractors. Contractor may utilize Walter Holmes Electric Inc. as subcontractor for this work. Subcontractor shall refer to Section 7 for insurance requirements Contractor shall include all sub-contractors as insureds under its policies or shall furnish separate certificates for each sub-contractor. All coverage for sub-contractors shall be subject to all of the requirements stated herein. CGL coverage shall include independent contractors' coverage, and Contractor shall be responsible for assuring that all sub-contractors are properly insured.

7.11 Conditions

7.11.1 The insurance required for this Contract must be on forms acceptable to County.

7.11.2 Where circumstances warrant, County may, at its discretion subject to acceptance by the Risk Management and Finance Department accept letters of credit or custodial accounts in lieu of specific insurance requirements.

7.11.3 Contractor shall provide that the insurance contributing to satisfaction of insurance requirements in this Contract shall not be canceled, terminated, or modified by Contractor without prior written approval of County.

7.11.4 Contractor shall promptly notify the New Hanover Property Management and the Risk Management Office at (910) 798-7497 of any accidents arising in the course of operations under the Contract causing bodily injury or property damage.

7.11.5 County reserves the right to obtain complete, certified copies of all required insurance policies, at any time.

7.11.6 Failure of County to demand a certificate of insurance or other evidence of full compliance with these insurance requirements or failure of County to identify a deficiency from evidence that is provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.

7.11.7 By requiring insurance herein, County does not represent that coverage and limits will necessarily be adequate to protect Contractor and such coverage and limits shall not be deemed as a limitation of Contractor's liability under the indemnities granted to County in this Contract.

7.11.8 If Contractor fails to maintain the insurance as set forth herein, County shall have the right, but not the obligation, to purchase said insurance at Contractor's expense.

7.11.9 Contractor or its agent may apply to County for approval of higher deductibles based on financial capacity and quality of the carrier affording coverage.

7.11.10 County shall have the right, but not the obligation of prohibiting Contractor or any sub-contractor from entering the project site or withhold payment until such certificates or other evidence that insurance has been placed in complete compliance with these requirements is received and approved by County.

7.12 Standard of Care. Contractor shall exercise reasonable care and skill as might be expected from similarly situated Contractors performing work or services of the kind required under this Contract at the time and the place where the services are rendered. The staff of and subcontracted Contractors engaged by Contractor shall possess the experience, knowledge and character necessary to qualify them to perform the particular duties to which they are assigned.

8. Independent Contractor. The parties mutually agree that the Contractor is an independent contractor and not an agent of the County, and as such, the Contractor shall not be entitled to any County employment benefits, such as, but not limited to, vacation, sick leave, insurance, workmen's compensation, or pension and retirement benefits.

9. Default and Termination. If Contractor fails to prosecute the work or services with such diligence as will insure its completion within the Contract time, or if Contractor breaches any of the terms or conditions contained in this Contract and fails to cure said breach within two (2) days of County's mailing of Notice of Default, or otherwise fails to perform the work or services hereunder to the County's reasonable satisfaction, County may terminate this Contract forthwith. Upon termination, County may, without prejudice to an action for damages or any other remedy, take the prosecution of the work or services out of the hands of Contractor. County may enter into another Contract for the completion of the Contract, or use such other methods as may be required for the completion of the Contract. County may deduct all costs of completing the Contract from any monies due or which may become due to Contractor. In the event this Contract is terminated prior to completion of the services by the Contractor, the Contractor shall be paid for work or services performed to the date of termination. In no event will the amount due Contractor in the event of termination exceed that amount set forth in this Contract. Nothing contained herein shall prevent the County from pursuing any other remedy, which it may have against Contractor, including claims for damages.

10. Termination for Convenience. County may terminate this Contract for convenience at any time and without cause. Upon receipt of notice, Contractor shall immediately discontinue providing the work or service and, if applicable, placing any orders for any materials, facilities, and supplies in connection with the performance of the work or services of this Contract.

11. Non-appropriation. All funds for payment by County under this Contract are subject to the availability of any annual appropriation for this purpose by the Board of Commissioners. In the event of non-appropriation of funds by the Board of Commissioners for the services provided under the Contract, County will terminate the Contract, without termination charge or liability, on the last day of the then-current fiscal year or when the appropriation made for then-current year for the services/items covered by this Contract is spent, whichever occurs first. If at any time funds are not appropriated for the continuance of this Contract, cancellation shall be accepted by the Professional on ten (10) business days' prior written notice, but failure to give such

notice shall be of no effect and County shall not be obligated under this Contract beyond the date of termination.

12. Non-waiver of Rights. The parties mutually agree that either party's failure to insist upon the strict performance of any provision of this Contract or to exercise any right based upon a breach thereof, or the acceptance of any performance during such breach, shall not constitute a waiver of any rights under this Contract.

13. Conflict of Interest. No paid employee of the County shall have a personal or financial interest, direct or indirect, as a contracting party or otherwise, in the performance of this Contract.

14. Subcontracts. The Contractor shall utilize no subcontractors for carrying out the services to be performed under this Contract without the written approval of the County.

15. Entire Contract. This Contract constitutes the entire understanding of the parties.

16. Binding Effect. This Contract shall be binding upon the parties hereto, and their heirs, successors, executors, administrators and assigns.

17. Further Actions. The parties will make and execute all further instruments and documents required to carry out the purposes and intent of this Contract.

18. Severability. If any provision of this Contract is held unenforceable, then such provision will be modified to reflect the parties' intention. All remaining provisions of this Contract shall remain in full force and effect.

19. Inclusive Terms. Use of the masculine herein shall include the feminine and neuter, and the singular shall include the plural.

20. Governing Law. All of the terms and conditions contained herein shall be interpreted in accordance with the laws of the State of North Carolina.

21. Accounting Procedures for Refund of County Sales & Use Tax. Pursuant to G.S. 105-164.14(c), the County is entitled to a refund of sales and/or use taxes paid by contractors on purchases of building materials, supplies, fixtures and equipment that become a part of or are annexed to any building or structure that is

owned or leased by the County and is being erected, altered or repaired for use by the County.

Contractors shall provide a "certified statement" containing the specific required information. The certified statement must include all of the following information:

- a. the date the property was purchased;
- b. the type of property purchased;
- c. the cost of property purchased and the amount of sales and use taxes paid thereon;
- d. the project for which the property was used;
- e. if the property was purchased in this State, the county to which it was delivered; and
- f. if the property was not purchased in this State, the county in which the property was used.

If the contractor makes several purchases from the same vendor, the certified statement must indicate each invoice number, the inclusive dates of the invoices, the total amount each invoice, and the state and local sales and use taxes paid on the purchase. The statement must also include the cost of any tangible personal property withdrawn from the contractor's warehouse stock and the amount of state and local sales or use tax paid by the contractor. If subcontractors are used, similar certified statements by its subcontractors must be obtained by the general contractor and furnished to the County. Local sales or use taxes included in the contractor's statements must be shown separately from the State sales or use taxes. The contractor's statements must not contain sales or use taxes paid on purchases of tangible personal property purchased by the contractor for use in performing the contract which does not annex to, affix to or in some manner become a part of the building or structure that is owned or leased by the County and is being erected, altered or repaired for use by the County.

Examples of property on which sales or use tax has been paid by the contractor and which shall not be included in the contractor's statement are scaffolding, forms for concrete, fuel for the operation of machinery and equipment, tools, equipment, equipment repair parts and equipment rentals.

A certified statement must be provided with each pay request. If there was no sales or use tax paid during the period, the contractor shall provide a "Zero" sales and use tax statement. .

22. Notices. All notices required hereunder to be sent to either party shall be sent to the following designated addresses, or to such other address or addresses as may hereafter be designated by either party by mailing of written notice of such change of address, by Certified Mail, Return Receipt Requested:

To County:

New Hanover County Property Management
Attn: Kevin Caison
200 Division Drive
Wilmington, NC 28401

To Contractor:

23. Assignability. The parties hereto agree that this Contract is not transferable and shall not be assigned by either party without the written consent of the other party to this Contract.

24. Contract Under Seal. The parties hereto expressly agree to create a Contract under seal.

IN WITNESS WHEREOF, the parties have hereunto affixed their hands and seals, the day and year first above written and by authority duly given.

NEW HANOVER COUNTY

[SEAL]

_____ County Manager

ATTEST:

Clerk to the Board

[SEAL]

CONTRACTOR

President (Seal)

ATTEST:

Secretary

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

Approved as to form:

County Finance Director

County Attorney

NORTH CAROLINA

NEW HANOVER COUNTY

I, _____, a Notary Public of the State and County aforesaid, certify that Teresa P. Elmore acknowledged that she is Clerk to the Board of Commissioners of New Hanover County, and that by authority duly given and as the act of the Board, the foregoing instrument was signed in its name by its _____ County Manager, sealed with its corporate seal and attested by herself as its Clerk.

WITNESS my hand and official seal, this _____ day of _____, 2015.

Notary Public

My commission expires: _____

STATE OF _____

_____ COUNTY

I, _____, a Notary Public of the State and County aforesaid, certify that _____ came before me this day and

acknowledged that (s)he is Secretary of _____
an _____, and that by County duly given and as the act of
the corporation, the foregoing instrument was signed in its name by its President and
sealed with its corporate seal.

WITNESS my hand and official seal, this ____ day of
_____, 2015.

Notary Public

My commission expires: _____