OFFICE OF THE CITY ATTORNEY
CHARLES PARKIN, City Attorney
411 West Ocean Boulevard, 9th Floor
Long Beach, CA 90802-4664

AGREEMENT

35903

THIS AGREEMENT is made and entered, in duplicate, as of April 19, 2021, for reference purposes only, pursuant to a minute order adopted by the City Council of the City of Long Beach at its meeting on April 13, 2021, by and between INTELINET INCORPORATED, a California corporation ("Consultant"), with a place of business at 9106 Pulsar Court, Unit H, Corona, California 92883, and the CITY OF LONG BEACH, a municipal corporation ("City").

WHEREAS, City requires specialized services requiring unique skills to be performed in connection with as-needed Citywide data, telephone, and fiber optic structured cabling ("Project"); and

WHEREAS, City has selected Consultant in accordance with City's administrative procedures and City has determined that Consultant and its employees are qualified, licensed, if so required, and experienced in performing these specialized services; and

WHEREAS, City desires to have Consultant perform these specialized services, and Consultant is willing and able to do so on the terms and conditions in this Agreement;

NOW, THEREFORE, in consideration of the mutual terms, covenants, and conditions in this Agreement, the parties agree as follows:

1. SCOPE OF WORK OR SERVICES.

A. Consultant shall furnish specialized services more particularly described in Exhibit "A", attached to this Agreement and incorporated by this reference, in accordance with the standards of the profession, and City shall pay for these services in the manner described below, in an annual amount not to exceed Eight Hundred Thousand Dollars ($800,000), at the rates or charges shown in Exhibit "B".

B. The City's obligation to pay the sum stated above for any one

fiscal year shall be contingent upon the City Council of the City appropriating the necessary funds for such payment by the City in each fiscal year during the term of this Agreement. For the purposes of this Section, a fiscal year commences on October 1 of the year and continues through September 30 of the following year. In the event that the City Council of the City fails to appropriate the necessary funds for any fiscal year, then, and in that event, the Agreement will terminate at no additional cost or obligation to the City.

C. Consultant may select the time and place of performance for these services; provided, however, that access to City documents, records and the like, if needed by Consultant, shall be available only during City's normal business hours and provided that milestones for performance, if any, are met.

D. Consultant has requested to receive regular payments. City shall pay Consultant in due course of payments following receipt from Consultant and approval by City of invoices showing the services or task performed, the time expended (if billing is hourly), and the name of the Project. Consultant shall certify on the invoices that Consultant has performed the services in full conformance with this Agreement and is entitled to receive payment. Each invoice shall be accompanied by a progress report indicating the progress to date of services performed and covered by the invoice, including a brief statement of any Project problems and potential causes of delay in performance, and listing those services that are projected for performance by Consultant during the next invoice cycle. Where billing is done and payment is made on an hourly basis, the parties acknowledge that this arrangement is either customary practice for Consultant's profession, industry or business, or is necessary to satisfy audit and legal requirements which may arise due to the fact that City is a municipality.

E. Consultant represents that Consultant has obtained all necessary information on conditions and circumstances that may affect its performance and has conducted site visits, if necessary.

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F. CAUTION: Consultant shall not begin work until this Agreement has been signed by both parties and until Consultant's evidence of insurance has been delivered to and approved by City.

2. TERM. The term of this Agreement shall commence at midnight on May 1, 2021, and shall terminate at 11:59 p.m. on April 30, 2023, unless sooner terminated as provided in this Agreement, or unless the services or the Project is completed sooner. The term may be extended for three (3) additional one-year periods, at the discretion of the City Manager.

3. COORDINATION AND ORGANIZATION.

A. Consultant shall coordinate its performance with City's representative, if any, named in Exhibit "C", attached to this Agreement and incorporated by this reference. Consultant shall advise and inform City's representative of the work in progress on the Project in sufficient detail so as to assist City's representative in making presentations and in holding meetings on the Project. City shall furnish to Consultant information or materials, if any, described in Exhibit "D", attached to this Agreement and incorporated by this reference, and shall perform any other tasks described in the Exhibit.

B. The parties acknowledge that a substantial inducement to City for entering this Agreement was and is the reputation and skill of Consultant's key employee, named in Exhibit "E" attached to this Agreement and incorporated by this reference. City shall have the right to approve any person proposed by Consultant to replace that key employee.

4. INDEPENDENT CONTRACTOR. In performing its services, Consultant is and shall act as an independent contractor and not an employee, representative or agent of City. Consultant shall have control of Consultant's work and the manner in which it is performed. Consultant shall be free to contract for similar services to be performed for others during this Agreement; provided, however, that Consultant acts in accordance with Section 9 and Section 11 of this Agreement. Consultant acknowledges

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and agrees that (a) City will not withhold taxes of any kind from Consultant's compensation; (b) City will not secure workers' compensation or pay unemployment insurance to, for or on Consultant's behalf; and (c) City will not provide and Consultant is not entitled to any of the usual and customary rights, benefits or privileges of City employees. Consultant expressly warrants that neither Consultant nor any of Consultant's employees or agents shall represent themselves to be employees or agents of City.

5. INSURANCE.

A. As a condition precedent to the effectiveness of this Agreement, Consultant shall procure and maintain, at Consultant's expense for the duration of this Agreement, from insurance companies that are admitted to write insurance in California and have ratings of or equivalent to A:V by A.M. Best Company or from authorized non-admitted insurance companies subject to Section 1763 of the California Insurance Code and that have ratings of or equivalent to A:VIII by A.M. Best Company, the following insurance:

i. Commercial general liability insurance (equivalent in scope to ISO form CG 00 01 11 85 or CG 00 01 10 93) in an amount not less than One Million Dollars ($1,000,000.00) per each occurrence and Two Million Dollars ($2,000,000.00) general aggregate. This coverage shall include but not be limited to broad form contractual liability, cross liability, independent contractors liability, and products and completed operations liability. City, its boards and commissions, and their officials, employees and agents shall be named as additional insureds by endorsement (on City's endorsement form or on an endorsement equivalent in scope to ISO form CG 20 10 11 85 or CG 20 26 11 85 or both CG 20 10 07 04 and CG 20 37 07 04 or both CG 20 33 07 04 and CG 20 37 07 04), and this insurance shall contain no special limitations on the scope of protection given to City, its boards and commissions, and their officials, employees and agents. This policy shall be endorsed to state that the insurer waives its right of subrogation against City,

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its boards and commissions, and their officials, employees and agents.

ii. Workers' Compensation insurance as required by the California Labor Code and employer's liability insurance in an amount not less than One Million Dollars ($1,000,000.00). This policy shall be endorsed to state that the insurer waives its right of subrogation against City, its boards and commissions, and their officials, employees and agents.

iii. Professional liability or errors and omissions insurance in an amount not less than One Million Dollars ($1,000,000.00) per claim.

iv. Commercial automobile liability insurance (equivalent in scope to ISO form CA 00 01 06 92), covering Auto Symbol 1 (Any Auto) in an amount not less than Five Hundred Thousand Dollars ($500,000.00) combined single limit per accident.

B. Any self-insurance program, self-insured retention, or deductible must be separately approved in writing by City's Risk Manager or designee and shall protect City, its officials, employees and agents in the same manner and to the same extent as they would have been protected had the policy or policies not contained retention or deductible provisions.

C. Each insurance policy shall be endorsed to state that coverage shall not be reduced, non-renewed or canceled except after thirty (30) days prior written notice to City, shall be primary and not contributing to any other insurance or self-insurance maintained by City, and shall be endorsed to state that coverage maintained by City shall be excess to and shall not contribute to insurance or self-insurance maintained by Consultant. Consultant shall notify City in writing within five (5) days after any insurance has been voided by the insurer or cancelled by the insured.

D. If this coverage is written on a "claims made" basis, it must provide for an extended reporting period of not less than one hundred eighty (180) days, commencing on the date this Agreement expires or is terminated, unless

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Consultant guarantees that Consultant will provide to City evidence of uninterrupted, continuing coverage for a period of not less than three (3) years, commencing on the date this Agreement expires or is terminated.

E. Consultant shall require that all subconsultants or contractors that Consultant uses in the performance of these services maintain insurance in compliance with this Section unless otherwise agreed in writing by City's Risk Manager or designee.

F. Prior to the start of performance, Consultant shall deliver to City certificates of insurance and the endorsements for approval as to sufficiency and form. In addition, Consultant shall, within thirty (30) days prior to expiration of the insurance, furnish to City certificates of insurance and endorsements evidencing renewal of the insurance. City reserves the right to require complete certified copies of all policies of Consultant and Consultant's subconsultants and contractors, at any time. Consultant shall make available to City's Risk Manager or designee all books, records and other information relating to this insurance, during normal business hours.

G. Any modification or waiver of these insurance requirements shall only be made with the approval of City's Risk Manager or designee. Not more frequently than once a year, City's Risk Manager or designee may require that Consultant, Consultant's subconsultants and contractors change the amount, scope or types of coverages required in this Section if, in his or her sole opinion, the amount, scope or types of coverages are not adequate.

H. The procuring or existence of insurance shall not be construed or deemed as a limitation on liability relating to Consultant's performance or as full performance of or compliance with the indemnification provisions of this Agreement.

6. ASSIGNMENT AND SUBCONTRACTING. This Agreement contemplates the personal services of Consultant and Consultant's employees, and the parties acknowledge that a substantial inducement to City for entering this Agreement was

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and is the professional reputation and competence of Consultant and Consultant's employees. Consultant shall not assign its rights or delegate its duties under this Agreement, or any interest in this Agreement, or any portion of it, without the prior approval of City, except that Consultant may with the prior approval of the City Manager of City, assign any moneys due or to become due Consultant under this Agreement. Any attempted assignment or delegation shall be void, and any assignee or delegate shall acquire no right or interest by reason of an attempted assignment or delegation. Furthermore, Consultant shall not subcontract any portion of its performance without the prior approval of the City Manager or designee, or substitute an approved subconsultant or contractor without approval prior to the substitution. Nothing stated in this Section shall prevent Consultant from employing as many employees as Consultant deems necessary for performance of this Agreement.

7. CONFLICT OF INTEREST. Consultant, by executing this Agreement, certifies that, at the time Consultant executes this Agreement and for its duration, Consultant does not and will not perform services for any other client which would create a conflict, whether monetary or otherwise, as between the interests of City and the interests of that other client. Consultant further certifies that Consultant does not now have and shall not acquire any interest, direct or indirect, in the area covered by this Agreement or any other source of income, interest in real property or investment which would be affected in any manner or degree by the performance of Consultant's services hereunder. And, Consultant shall obtain similar certifications from Consultant's employees, subconsultants and contractors.

8. MATERIALS. Consultant shall furnish all labor and supervision, supplies, materials, tools, machinery, equipment, appliances, transportation and services necessary to or used in the performance of Consultant's obligations under this Agreement, except as stated in Exhibit "D".

9. OWNERSHIP OF DATA. All materials, information and data prepared, developed or assembled by Consultant or furnished to Consultant in connection

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with this Agreement, including but not limited to documents, estimates, calculations, studies, maps, graphs, charts, computer disks, computer source documentation, samples, models, reports, summaries, drawings, designs, notes, plans, information, material and memorandum ("Data") shall be the exclusive property of City. Data shall be given to City, in a format identified by City, and City shall have the unrestricted right to use and disclose the Data in any manner and for any purpose without payment of further compensation to Consultant. Copies of Data may be retained by Consultant but Consultant warrants that Data shall not be made available to any person or entity for use without the prior approval of City. This warranty shall survive termination of this Agreement for five (5) years.

10. TERMINATION. Either party shall have the right to terminate this Agreement for any reason or no reason at any time by giving fifteen (15) calendar days prior written notice to the other party. In the event of termination under this Section, City shall pay Consultant for services satisfactorily performed and costs incurred up to the effective date of termination for which Consultant has not been previously paid. The procedures for payment in Section 1.B. with regard to invoices shall apply. On the effective date of termination, Consultant shall deliver to City all Data developed or accumulated in the performance of this Agreement, whether in draft or final form, or in process. And, Consultant acknowledges and agrees that City's obligation to make final payment is conditioned on Consultant's delivery of the Data to City.

11. CONFIDENTIALITY. Consultant shall keep all Data confidential and shall not disclose the Data or use the Data directly or indirectly, other than in the course of performing its services, during the term of this Agreement and for five (5) years following expiration or termination of this Agreement. In addition, Consultant shall keep confidential all information, whether written, oral or visual, obtained by any means whatsoever in the course of performing its services for the same period of time. Consultant shall not disclose any or all of the Data to any third party, or use it for Consultant's own benefit or the benefit of others except for the purpose of this Agreement.

12. BREACH OF CONFIDENTIALITY. Consultant shall not be liable for

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a breach of confidentiality with respect to Data that: (a) Consultant demonstrates Consultant knew prior to the time City disclosed it; or (b) is or becomes publicly available without breach of this Agreement by Consultant; or (c) a third party who has a right to disclose does so to Consultant without restrictions on further disclosure; or (d) must be disclosed pursuant to subpoena or court order.

13. ADDITIONAL COSTS AND REDESIGN.

A. Any costs incurred by City due to Consultant's failure to meet the standards required by the scope of work or Consultant's failure to perform fully the tasks described in the scope of work which, in either case, causes City to request that Consultant perform again all or part of the Scope of Work shall be at the sole cost of Consultant and City shall not pay any additional compensation to Consultant for its re-performance.

B. If the Project involves construction and the scope of work requires Consultant to prepare plans and specifications with an estimate of the cost of construction, then Consultant may be required to modify the plans and specifications, any construction documents relating to the plans and specifications, and Consultant's estimate, at no cost to City, when the lowest bid for construction received by City exceeds by more than ten percent (10%) Consultant's estimate. This modification shall be submitted in a timely fashion to allow City to receive new bids within four (4) months after the date on which the original plans and specifications were submitted by Consultant.

14. AMENDMENT. This Agreement, including all Exhibits, shall not be amended, nor any provision or breach waived, except in writing signed by the parties which expressly refers to this Agreement.

15. LAW. This Agreement shall be construed in accordance with the laws of the State of California, and the venue for any legal actions brought by any party with respect to this Agreement shall be the County of Los Angeles, State of California for state actions and the Central District of California for any federal actions. Consultant shall cause

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all work performed in connection with construction of the Project to be performed in compliance with (1) all applicable laws, ordinances, rules and regulations of federal, state, county or municipal governments or agencies (including, without limitation, all applicable federal and state labor standards, including the prevailing wage provisions of sections 1770 *et seq.* of the California Labor Code); and (2) all directions, rules and regulations of any fire marshal, health officer, building inspector, or other officer of every governmental agency now having or hereafter acquiring jurisdiction.

16. WORK DAY. Consultant shall comply with Sections 1810 through 1815 of the California Labor Code regarding hours of work. Consultant shall forfeit, as a penalty to City, the sum of Twenty-Five Dollars ($25) for each worker employed by Consultant or any subcontractor for each calendar day such worker is required or permitted to work more than eight (8) hours unless that worker receives compensation in accordance with Section 1815.

17. DEPARTMENT OF INDUSTRIAL RELATIONS COMPLIANCE. Consultant is advised that this work constitutes a public work of improvement subject to California Labor Code Division 2, Part 7, Chapter 1, Articles 1-5, §§1720-1861. Pursuant to Labor Code Section 1771.1. Consultant or subcontractors shall not be qualified to bid on, be listed in a bid proposal, subject to the requirements of Section 4104 of the Public contract Code, or engage in the performance of any contract for public work, as defined in the California Labor Code, unless currently registered and qualified to perform public work pursuant to Section 1725.5. Contract (or associated subcontracts) shall not be entered into without proof of the Consultant's (or subcontractor's) current registration to perform public work pursuant to Section 1725.5. All work conducted in support of this public work of improvement is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Consultant will abide by all applicable apprenticeship requirements in the California Labor Code Section 1777.5 and will be responsible for subcontractor apprenticeship compliance to the same.

18. PREVAILING WAGE RATES. Consultant is directed to pay the

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general rate of per diem wages for each craft, classification, or type of worker needed to execute the contract (prevailing wage rates). Copies of the current prevailing rate of per diem wages are on file at is principle office (Labor Compliance Division, 411 W. Ocean Boulevard, 6th Floor, Long Beach, California, 90802), and shall be made available to any interested party upon request. Consultant is required to post a copy of the determination of the director of the prevailing rate of per diem wages at each job site. Pursuant to Section 1775, Consultant shall forfeit, as a penalty to the City, up to Two Hundred Dollars ($200) for each laborer, worker or mechanic employed for each calendar day, or portion thereof, that such laborer, worker or mechanic is paid less than the prevailing wage rates for any work done by Consultant, or any subcontractor, under this Contract. The difference between the prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by the Consultant or subcontractor.

19. CERTIFIED PAYROLL RECORDS.

A. Pursuant to the provisions of Labor Code Section 1776, Consultant shall keep and shall cause each subcontractor performing any portion of the work under this Contract to keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by Consultant or subcontractor in connection with the work. Such payroll records for Consultant and all subcontractors shall be certified and shall be available for inspection at all reasonable hours at the principal office of Consultant pursuant to the provisions of Section 1776 of the Labor Code. Consultant's failure to furnish such records to City or City's authorized Labor Compliance representative in the manner provided herein for notices shall entitle City to withhold the penalty prescribed by law from progress payments due to Consultant.

B. Consultant shall submit to the City certified payroll records for

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Consultant and all subcontractors performing any portion of the work under this Contract on a monthly basis. Certified payroll records for Consultant and all subcontractors shall be maintained during the course of the work and shall be kept by Consultant for up to three (3) years after completion of the work.

C. The foregoing is in addition to, and not in lieu of, any other requirements or obligations established and imposed by any department of the City with regard to submission and retention of certified payroll records for Consultant and subcontractors.

20. ENTIRE AGREEMENT. This Agreement, including all Exhibits, constitutes the entire understanding between the parties and supersedes all other agreements, oral or written, with respect to the subject matter in this Agreement.

21. INDEMNITY.

A. Consultant shall indemnify, protect and hold harmless City, its Boards, Commissions, and their officials, employees and agents ("Indemnified Parties"), from and against any and all liability, claims, demands, damage, loss, obligations, causes of action, proceedings, awards, fines, judgments, penalties, costs and expenses, arising or alleged to have arisen, in whole or in part, out of or in connection with (1) Consultant's breach or failure to comply with any of its obligations contained in this Agreement, including any obligations arising from the Project's compliance with or failure to comply with applicable laws, including all applicable federal and state labor requirements including, without limitation, the requirements of California Labor Code section 1770 *et seq.* or (2) negligent or willful acts, errors, omissions or misrepresentations committed by Consultant, its officers, employees, agents, subcontractors, or anyone under Consultant's control, in the performance of work or services under this Agreement (collectively "Claims" or individually "Claim").

B. In addition to Consultant's duty to indemnify, Consultant shall have a separate and wholly independent duty to defend Indemnified Parties at

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Consultant's expense by legal counsel approved by City, from and against all Claims, and shall continue this defense until the Claims are resolved, whether by settlement, judgment or otherwise. No finding or judgment of negligence, fault, breach, or the like on the part of Consultant shall be required for the duty to defend to arise. City shall notify Consultant of any Claim, shall tender the defense of the Claim to Consultant, and shall assist Consultant, as may be reasonably requested, in the defense.

C. If a court of competent jurisdiction determines that a Claim was caused by the sole negligence or willful misconduct of Indemnified Parties, Consultant's costs of defense and indemnity shall be (1) reimbursed in full if the court determines sole negligence by the Indemnified Parties, or (2) reduced by the percentage of willful misconduct attributed by the court to the Indemnified Parties.

D. The provisions of this Section shall survive the expiration or termination of this Agreement.

22. AMBIGUITY. In the event of any conflict or ambiguity between this Agreement and any Exhibit, the provisions of this Agreement shall govern.

23. FORCE MAJEURE. If any party fails to perform its obligations because of strikes, lockouts, labor disputes, embargoes, acts of God, inability to obtain labor or materials or reasonable substitutes for labor materials, governmental restrictions, governmental regulations, governmental controls, judicial orders, enemy or hostile governmental action, pandemic, civil commotion, fire or other casualty, or other causes beyond the reasonable control of the party obligated to perform, then that party's performance will be excused for a period equal to the period of such cause for failure to perform.

24. NONDISCRIMINATION.

A. In connection with performance of this Agreement and subject to applicable rules and regulations, Consultant shall not discriminate against any employee or applicant for employment because of race, religion, national origin,

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color, age, sex, sexual orientation, gender identity, AIDS, HIV status, handicap or disability. Consultant shall ensure that applicants are employed, and that employees are treated during their employment, without regard to these bases. These actions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

B. It is the policy of City to encourage the participation of Disadvantaged, Minority and Women-Owned Business Enterprises in City's procurement process, and Consultant agrees to use its best efforts to carry out this policy in its use of subconsultants and contractors to the fullest extent consistent with the efficient performance of this Agreement. Consultant may rely on written representations by subconsultants and contractors regarding their status. Consultant shall report to City in May and in December or, in the case of short-term agreements, prior to invoicing for final payment, the names of all subconsultants and contractors hired by Consultant for this Project and information on whether or not they are a Disadvantaged, Minority or Women-Owned Business Enterprise, as defined in Section 8 of the Small Business Act (15 U.S.C. Sec. 637).

25. EQUAL BENEFITS ORDINANCE. Unless otherwise exempted in accordance with the provisions of the Ordinance, this Agreement is subject to the applicable provisions of the Equal Benefits Ordinance (EBO), section 2.73 et seq. of the Long Beach Municipal Code, as amended from time to time.

A. During the performance of this Agreement, the Consultant certifies and represents that the Consultant will comply with the EBO. The Consultant agrees to post the following statement in conspicuous places at its place of business available to employees and applicants for employment:

"During the performance of a contract with the City of Long Beach, the Consultant will provide equal benefits to employees with spouses and its

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employees with domestic partners. Additional information about the City of Long Beach's Equal Benefits Ordinance may be obtained from the City of Long Beach Business Services Division at 562-570-6200."

B. The failure of the Consultant to comply with the EBO will be deemed to be a material breach of the Agreement by the City.

C. If the Consultant fails to comply with the EBO, the City may cancel, terminate or suspend the Agreement, in whole or in part, and monies due or to become due under the Agreement may be retained by the City. The City may also pursue any and all other remedies at law or in equity for any breach.

D. Failure to comply with the EBO may be used as evidence against the Consultant in actions taken pursuant to the provisions of Long Beach Municipal Code 2.93 et seq., Contractor Responsibility.

E. If the City determines that the Consultant has set up or used its contracting entity for the purpose of evading the intent of the EBO, the City may terminate the Agreement on behalf of the City. Violation of this provision may be used as evidence against the Consultant in actions taken pursuant to the provisions of Long Beach Municipal Code Section 2.93 et seq., Contractor Responsibility.

26. NOTICES. Any notice or approval required by this Agreement shall be in writing and personally delivered or deposited in the U.S. Postal Service, first class, postage prepaid, addressed to Consultant at the address first stated above, and to City at 411 West Ocean Boulevard, Long Beach, California 90802, Attn: City Manager, with a copy to the City Engineer at the same address. Notice of change of address shall be given in the same manner as stated for other notices. Notice shall be deemed given on the date deposited in the mail or on the date personal delivery is made, whichever occurs first.

27. COPYRIGHTS AND PATENT RIGHTS.

A. Consultant shall place the following copyright protection on all Data: © City of Long Beach, California ____, inserting the appropriate year.

B. City reserves the exclusive right to seek and obtain a patent or

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copyright registration on any Data or other result arising from Consultant's performance of this Agreement. By executing this Agreement, Consultant assigns any ownership interest Consultant may have in the Data to City.

C. Consultant warrants that the Data does not violate or infringe any patent, copyright, trade secret or other proprietary right of any other party. Consultant agrees to and shall protect, defend, indemnify and hold City, its officials and employees harmless from any and all claims, demands, damages, loss, liability, causes of action, costs or expenses (including reasonable attorney's fees) whether or not reduced to judgment, arising from any breach or alleged breach of this warranty.

28. COVENANT AGAINST CONTINGENT FEES. Consultant warrants that Consultant has not employed or retained any entity or person to solicit or obtain this Agreement and that Consultant has not paid or agreed to pay any entity or person any fee, commission or other monies based on or from the award of this Agreement. If Consultant breaches this warranty, City shall have the right to terminate this Agreement immediately notwithstanding the provisions of Section 10 or, in its discretion, to deduct from payments due under this Agreement or otherwise recover the full amount of the fee, commission or other monies.

29. WAIVER. The acceptance of any services or the payment of any money by City shall not operate as a waiver of any provision of this Agreement or of any right to damages or indemnity stated in this Agreement. The waiver of any breach of this Agreement shall not constitute a waiver of any other or subsequent breach of this Agreement.

30. CONTINUATION. Termination or expiration of this Agreement shall not affect rights or liabilities of the parties which accrued pursuant to Sections 7, 10, 11, 17, 19, 22 and 28 prior to termination or expiration of this Agreement.

31. TAX REPORTING. As required by federal and state law, City is obligated to and will report the payment of compensation to Consultant on Form 1099-

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Misc. Consultant shall be solely responsible for payment of all federal and state taxes resulting from payments under this Agreement. Consultant shall submit Consultant's Employer Identification Number (EIN), or Consultant's Social Security Number if Consultant does not have an EIN, in writing to City's Accounts Payable, Department of Financial Management. Consultant acknowledges and agrees that City has no obligation to pay Consultant until Consultant provides one of these numbers.

32. ADVERTISING. Consultant shall not use the name of City, its officials or employees in any advertising or solicitation for business or as a reference, without the prior approval of the City Manager or designee.

33. AUDIT. City shall have the right at all reasonable times during the term of this Agreement and for a period of five (5) years after termination or expiration of this Agreement to examine, audit, inspect, review, extract information from and copy all books, records, accounts and other documents of Consultant relating to this Agreement.

34. THIRD PARTY BENEFICIARY. This Agreement is not intended or designed to or entered for the purpose of creating any benefit or right for any person or entity of any kind that is not a party to this Agreement.

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IN WITNESS WHEREOF, the parties have caused this document to be duly executed with all formalities required by law as of the date first stated above.

INTELINET INCORPORATED, a California corporation

MAY 3, 2021

By _____
Name EDWARD FUSCO
Title PRESIDENT

MAY 3, 2021

By _____
Name Darnell Milk
Title VP, COO

"Consultant"

CITY OF LONG BEACH, a municipal corporation

May 18, 2021

By _____
Linda F. Tatum
City Manager

"City"

EXECUTED PURSUANT TO SECTION 301 OF THE CITY CHARTER

This Agreement is approved as to form on May 6, 2021.

CHARLES PARKIN, City Attorney

By _____
Deputy

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EXHIBIT "A"

Scope of Work

PROJECT NARRATIVE FOR

CITY OF LONG BEACH
RFP# TI21-008
CITY WIDE FIBER OPTIC INSIDE CABLING

Submitted By
INTELINET INCORPORATED
9106 PULSAR COURT
UNIT H
CORONA, CA 92883

1. Executive Summary

Intelinet Incorporated (Intelinet) appreciates the opportunity to provide the following proposal to the City of Long Beach in response to the RFP #TI21-008, City-wide Fiber Optic Indoor Cabling. This response is for as needed cabling services and material procurement for projects at City facilities throughout the City of Long Beach.

Intelinet is a regional communication solutions provider that has approximately 45 employees located throughout Los Angeles, San Bernardino, Riverside and Orange Counties. Intelinet provides customers with innovative technology solutions that enable businesses to achieve superior results, faster and with greater efficiency.

Intelinet provides full-service implementation capabilities including construction, installation, and maintenance of telecommunications cabling and systems. Intelinet has extensive experience in the technology industry, deploying small and large structured cabling projects.

Intelinet founders and key personnel have a long history in the industry dating back to the 1970's. Their extensive history begins with the bell system/AT&T, continuing with Lucent Technologies/AVAYA, and currently with COMMSCOPE. Intelinet brings this rich history and experience to every project large or small.

Intelinet, with the full support of our manufacturer and distribution partners, will provide the level of support and expertise required to ensure the successful delivery of every project with minimal disruption to your internal organization.

Intelinet's culture is based on building a long-term value relationship with our customers to ensure that the user community Intelinet is serving receives the quality and service that they demand.

Our goal is to exceed customer expectations and gain 100% Customer Satisfaction, on every project.

SCOPE OF WORK

Intelinet understands the requirements of the, RFP, drawings, and this proposal. If awarded the Contract, Intelinet will provide labor and material for Telecommunications cabling as required in our contract to support the ongoing project implementation.

Intelinet understands the project complexities at the City of Long Beach facilities because we have nearly 10 years' experience working with the City on hundreds of projects throughout the City. Projects range from small add, moves and changes to large implementations that require a combination of fast paced rough-in, closet build out, termination, and station work during the new construction of a building. We also understand the large fiber optic backbone designs that are required to support the complex network the City installs and maintains. We will implement projects using train technicians, and professionally certified design personnel, and we will provide close out documentation packages as per the RFP.

Intelinet understands that all Design and Engineering for projects will be provided by the City and its representatives, however Intelinet will provide assistance and design support to the City as we have always done. We professionally engineer our proposals in accordance with the all pertinent documents provided and site conditions.

PROGRAM STRUCTURE

Program Development is very import to a project's success. With the proper planning and identification of potential issues, each project will be delivered successfully to the City's expectation level, on time and on budget.

To implement a program of this scope, up front planning is critical at the beginning of each project to allow for proper resource allocation. Time will be well spent identifying tasks, goals, milestones, and critical success factors

Intelinet will work with the City to develop and utilize a program structure that is mutually agreed upon in advance.

Intelinet will provide all project-tracking requirements to ensure the project is implemented on time as well as closed out properly, including all required deliverables.

Intelinet will provide all required logistics and coordination related to implementation of material ordering, staging, and delivering of materials.

Intelinet will provide the following value-added services to ensure successful program implementation.

Quality Assurance – Intelinet is committed to 100% Customer Satisfaction. In support of this commitment, we perform a variety of quality assurance processes. In-process quality control and RCDD reviews provide quality inspections during the installation to ensure that the installation is on-track and complies with the outlined requirements. The quality process includes every aspect of the project, from materials management to project leaders, engineers, and field technicians.

Turnkey Solutions – Intelinet is a full-service technology company committed to the highest quality workmanship and complete customer satisfaction. Over the years, Intelinet Incorporated has offered End-to-End solutions which have improved business processes and performance, by utilizing the latest technology. We meet complex business requirements by providing industry-compliant designs, implementation, and support for network infrastructure and communications cabling.

Implementation Services

Our team of project managers, infrastructure engineers, and cabling experts work together to offer the full suite of solutions. Projects must be installed and implemented within defined implementation dates, schedules, and building environmental constraints. Intelinet will supply all resources necessary to work in coordination with other trades to make the implementation successful.

Large-Scale Project Experience – Intelinet has a great deal of experience with large-scale projects using diverse cabling technologies. We have been able to leverage our founder's long history and well-established relationships in the industry to tackle very large projects. Our employees also have many years of experience in designing, implementing, and managing projects that are large in scale and complex in scope.

Industry Involvement – BICSI Membership – Intelinet is actively involved in outlining the importance of BICSI-certified, design and installation practices. Intelinet is committed to what BICSI stands for and agrees with its industry presence. Intelinet has RCDD and RTPM resources that will be utilized in the implementation of this program.

Manufacturer's Warranties – Intelinet has had a great partnership with SYSTIMAX since we opened our doors in 2004. Intelinet will deliver a certified 25-year warranty as a final deliverable for all applicable projects, as required. We are partnered with SYSTIMAX and can meet the requirements of each of the customer selected solution.

Project Management – Every Intelinet project has a defined Project Structure. Within the Project Management structure, there are dedicated Intelinet Project Manager(s) (PM) who are responsible for project deliverables, ensuring that the system installation is completed on time, per the scope of work, specification, and customer requirements

Intelinet believes that effective Project Management is a fundamental element leading to a successful project completion.

Employing strict Project Management methodologies will allow us to address the changing needs of each individual customer's requirements.

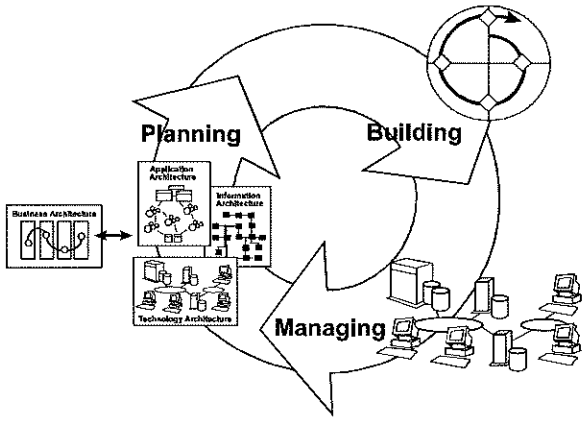
Using the information identified at the beginning of each project, the Project Manager will prepare a project plan for overall project implementation of that project. The Project Manager will work closely with the on-site Project Lead and client contact(s) to update the project plan to accurately reflect project status. Regular communication between the Intelinet project manager and the customer contact will ensure that the project plan accurately depicts the project status.

Intelinet Project Management is focused on the following key areas during the project life cycle:

A. Integration Management
   a. Coordination of installation tasks with other trades and owner's representatives
   b. Plan Development
   c. Installation
   d. Change Control

B. Scope Management
   a. Initiation
   b. Scope Planning
   c. Scope Verification
   d. Scope Change Control

C. Time Management



a. Activities Definitions
b. Sequencing
c. Duration Estimation
d. Schedule Development
e. Schedule Control

D. Budget and Cost Management
a. Resource Planning
b. Cost Budgeting
c. Cost Control
d. Materials Management

E. Quality Management
a. Quality Planning
b. In-Process Quality Control
c. Quality Assurance and Testing
d. Documentation

F. Communications
a. Information Distribution
b. Performance Reporting

Testing and Documentation - The testing and documentation methodologies provide the framework for ensuring a quality installation. Each cable is visually inspected, tested and certified for the application intended. Each manufacturer confirms that the project complies with the outlined manufacturer specification. The testing and documentation deliverables are submitted to the manufacturer (if required) who provides certification for each project. The manufacturer's warranty is sent directly to the customer. The customer will receive a copy of all test documentation as well as built drawings. As built drawings will be returned in the format received by Intelinet, typically soft copy PDF. Redline drawings will be provided by Intelinet when hard copies are received. Auto cad format can be provided when soft copies are received by Intelinet.

Maintenance / On-going Support Services – Intelinet is committed to the entire life cycle of our relationship with our customers. We are not only about delivering successful projects; we are about creating successful long-term relationships. Our belief is that once you are a customer, it's our goal to support and grow with you.

2. Customer References

Ross Stores, Inc.
City of Long Beach
Owner: **City of Long Beach**
Address: **333 West Ocean Blvd. Long Beach, CA 90802**
Contact: **Rick Barrett, Telecommunications Supervisor 562-570-7773**
Scope: Intelinet installs horizontal, fiber optic and copper backbone systems for numerous projects in Long Beach, CA. Cabling consists horizontal Category 6 certified systems and 50/125 fiber optic within buildings and SM fiber between buildings. Intelinet installed all cabling within the new City Hall Data Center and have completed projects from $5k to $500k for the City. The City of Long Beach is current customer and continues to have a great working relationship with Intelinet and our team.

Riverside County RCIT
Owner: **Riverside County Information Technology (RCIT)**
Address: **4080 Lemon St, Riverside, CA 92501**
Contact: **Tony Dellinger, MBA Telecom Engineer, RCDD 951 955-0587**
Scope: Intelinet has performed multiple projects of varying size and complexity for RCIT. We are one of the few approved vendors for the County of Riverside due to the strict training and certification requirements. Projects have ranged from $5k to $1.5mil. Facility range from office environments, medical buildings, hospitals and jail facilities. Intelinet has become a main vendor of choice for the County and have been a vendor for over 8 years.

PlanNet Consulting
Owner: **Headspace**
Address: **2415 Michigan Ave, Santa Monica, CA 90404**
Contact: **Roger Finianos, Delivery Lead (562)-556-0610**
Scope: Intelinet Incorporated has become the vendor of choice for structured cabling for the Headspace corporate offices in Los Angeles and other large customers for PlanNet. Installation of over 250 Category 6 drops in several new offices. Both fiber and copper backbone cabling was installed to multiple IT closet locations. Intelinet continues to be a valued partner for PlanNet at many sites throughout California.

City of Hope National Medical Center
Owner: **City of Hope National Medical Center**
Address: **1500 E. Duarte Road, Duarte, CA**
Contact: **Kamran Mirza, Director of Communications, Technologies (626) 827-0300**
Scope: Intelinet Inc. has installed multiple Category 6 voice and data locations throughout the campus on large and small project sizes. Intelinet also installed a major CORNING fiber optic backbone system and major copper backbone systems on the campus. City of Hope continues to be an anchor client for Intelinet with project ranging from moves, adds and changes to large project implementation. Largest project to date valued at over $950k in structured cabling which include fiber optic and copper cabling solutions.

Customer: **Disney**
Owner: **Disney Worldwide Services**
Address: **611 North Brand Blvd., Ninth Floor Glendale, CA 91203**
Contact: **Jason Cardella Telecom. Infrastructure Design 818.553.7403 (8492)**
Scope: Intelinet Incorporated has installed multiple Systimax SCS Structured cabling systems for Disney's facilities in Burbank and Glendale. The projects typically include copper and fiber optic backbone from the MDF to multiple IDF locations throughout the production and office facilities. Category 5e/6/6A cable were installed to support individual station locations and wireless access points. Projects range in size from approximately $20k to $300kvon the larger scale. Disney continues to be an anchor customer for Intelinet.

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3. Completed RFP in Full

City of Long Beach

Request For Proposals Number TI21-008

For

City-wide Fiber Optic Indoor Cabling

Release Date:	October 29, 2020
Mandatory Pre-Proposal Meeting:	November 17, 2020
Questions Due to the City:	December 02, 2020
Posting of the Q & A:	December 10, 2020
Due Date:	December 23, 2020

City Contact: *Tina Schaper, Buyer I* *562-570-7082*

See Section 4 for instructions on submitting proposals.

Company Name Intelinet Incorporated Contact Person Edward Fusco

Address 9106 Pulsar Ct Unit H City Corona State Ca Zip 92883

Telephone (951) 277 7669 Fax (____) _____ Federal Tax ID No. [redacted]

E-mail: efusco@intelnt.com

Prices contained in this proposal are subject to acceptance within 90 calendar days.

I have read, understand, and agree to all terms and conditions herein. Date 12/23/20

Signed _____

Print Name & Title Edward Fusco President

Rev 2016 0919

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1. OVERVIEW OF PROJECT

1. The City of Long Beach (City) is requesting proposals from qualified professional SYSTIMAX Certified System (SCS) and qualified Corning Fiber Installers/Vendors to furnish, install, trace, troubleshoot, document and/or certify data and phone network structured cabling systems, including Category 6/6A cabling, fiber optic cabling, splicing, wall jacks, cabling racks and terminations, and cable management solutions. The City's Technology and Innovation Department (TI) is seeking to pre-qualify firms for incidental, cabling projects/assignments that are required to enable City Departments to re-assign workspaces, to add devices such as multi-function printers, and to interconnect services from cable TV, telecommunication vendors, and internet service providers in a City facility that may include a City campus environment with multiple buildings and floors.

2. ACRONYMS/DEFINITIONS

For purposes of this Request For Proposals, the following acronyms/definitions will be used:

Awarded Contractor	An organization/individual that is awarded a contract with the City of Long Beach, California for the services identified in this RFP.
City	The City of Long Beach and any department or agency identified herein.
Contractor / Proposer	Organization/individual submitting a proposal in response to this RFP.
Department / Division	City of Long Beach, Technology & Innovation Department.
Evaluation Committee	An independent committee comprised solely of representatives of the City established to review proposals submitted in response to the RFP, evaluate the proposals, and select a Contractor.
May	Indicates something that is not mandatory but permissible.
RFP	Request for Proposals.
Shall / Must	Indicates a mandatory requirement. Failure to meet a mandatory requirement may result in the rejection of a proposal as non-responsive.
Should	Indicates something that is recommended but not mandatory. If the Contractor fails to provide recommended information, the City may, at its sole option, ask the Contractor to provide the information or evaluate the proposal without the information.
Subcontractor	Third party not directly employed by the Contractor who will provide services identified in this RFP.

3. SCOPE OF PROJECT

A. The City requires qualified SYSTIMAX Certified System vendors and qualified Corning certified Fiber Installers experienced with Structured Cabling systems, to furnish the materials and labor associated with the installation of data, telecommunications, and optical fiber cabling, e.g. Category 6/6A cabling, jacks, racks, and the associated items and materials for various City locations, to include individual facilities and City of Long Beach campus locations with multiple buildings, on an ongoing as-needed basis. All work must be done per these specifications, according to all applicable and acceptable industry standards, of the highest quality workmanship commensurate with the required work and completed by the time required.

B. The intent of these specifications is to describe the work requirements in general terms. The detailed specifications will be based on the requirements at the time that a given job is required. City will consider suggestions from Contractor and may accept alternates recommended if they provide equal or better functionality, durability, and cost effectiveness; however, City, in its sole discretion, may have specific requirements for any given job.

C. See Project Specifications – Section 7 for details.

D. See Attachment I - "City of Long Beach Telecommunications Specification" for precedence.

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4. SUBMITTAL INSTRUCTIONS

4.1 **For questions regarding this RFP, submit all inquiries via email to rfppurchasing@longbeach.gov by 11:00 AM on DECEMBER 2, 2020.** Responses to the questions will be posted on the City's website longbeach.gov/purchasing under the "Bids/RFPs" tab no later than the date and time shown below. All proposers are recommended to visit the abovementioned City website on a regular basis as the responses may be posted earlier than the date above.

4.1.1 The City will not be responsible for or bound by (1) any oral communication or (2) any other information or contact that occurs outside the official communication process specified herein, unless confirmed in writing by the City Contact.

4.2 **RFP Timeline (times indicated are Pacific Time)**

TASK	*DATE/TIME*
Mandatory pre-proposal meeting	November 17, 2020 at 10:00am
Deadline for submitting questions	December 02, 2020 at 11:00am
Answers to all questions submitted available	December 10, 2020 at 11:00am
Deadline for submission of proposals	December 23, 2020 at 11:00am
Evaluation period	December 28, 2020 to January 7, 2021
Selection of Contractor	January 2021

NOTE: These dates represent a tentative schedule of events. The City reserves the right to modify these dates at any time, with appropriate notice to prospective Contractors.

4.2.1 **Mandatory Pre-Proposal Meeting**

A mandatory, virtual pre-proposal meeting is scheduled for **November 17, 2020** at **10:00 AM** via this WebEx Meeting Link. **Use Meeting (access code) Number: 146 535 9213 and Password: S3Jem5KN3aY.** An invitation will be sent out to Contractors who are interested in submitting proposals for this RFP. **Please RSVP using the option provided in PlanetBids.** Attendance will be verified at the meeting. The purpose of this conference is to provide answers to questions regarding the RFP document. It is recommended that Contractors bring a copy of the RFP document to this virtual meeting. Only those who attend the meeting shall submit a Proposal.

4.3 Method of Submission

Electronic proposals shall be submitted via the City's secure online bidding system. All required sections of the proposal must be submitted via the website. Proposer is solely responsible for "on time" submission of their electronic narrative proposal and cost proposal. The Bid Management System will not accept late proposals and no exceptions shall be made. Proposers are reminded to submit their proposals with sufficient time to complete the submission process. Proposers will receive an e-bid confirmation number with a time stamp from the Bid Management System indicating that their proposal was submitted successfully. The City will only receive those proposals that were transmitted successfully.

RFP cover page shall be signed in ink, scanned and included with narrative proposal in the electronic proposal submission.

Submit proposal online at:
http://www.planetbids.com/portal/portal.cfm?CompanyID=15810

4.4 **Proposals must be received by 11:00 AM (PT) on DECEMBER 23, 2020.** Proposals that do not arrive by the specified date and time WILL NOT BE ACCEPTED. Contractors may submit their proposal any time prior to the above stated deadline. The City will not be held responsible for proposals mishandled as a result of technical error. Facsimile or telephone proposals will NOT be considered unless otherwise authorized; however, proposals may be modified by fax or written notice provided such notice is received prior to the opening of the proposals.

4.5 The proposal should be presented in a format that corresponds to and references sections outlined below in Section 4.10 and should be presented in the same order. Responses to each section and subsection should be labeled so as to indicate which item is being addressed. For ease of evaluation, proposals should be presented in the format described within this RFP.

4.6 Proposals are to be prepared in such a way as to provide a straightforward, concise delineation of capabilities to satisfy the requirements of this RFP. Colored displays, promotional materials, etc., are not necessary or desired. Emphasis should be concentrated on conformance to the RFP instructions, responsiveness to the RFP requirements, and on completeness and clarity of content.

4.7 Descriptions on how any and all equipment and/or services will be used to meet the requirements of this RFP shall be given, in detail, along with any additional information documents that are appropriately marked.

4.8 The proposal must be signed by the individual(s) legally authorized to bind the Contractor.

4.9 If complete responses cannot be provided without referencing supporting documentation, such documentation must be provided with the proposal and specific references made to the tab, page, section and/or paragraph where the supplemental information can be found.

4.10 Proposals shall be submitted in four (4) distinct parts:

- **Part One (1)** - Narrative/technical proposal
- **Part Two (2)** - Cost Proposal
- **Part Three (3)** – City Required Forms
- **Part Four (4)** – Financial Stability Documents/Statements

THE NARRATIVE/TECHNICAL PROPOSAL MUST NOT INCLUDE COST AND PRICING INFORMATION. The narrative/technical proposal will be reviewed first and then the cost proposal. Therefore, each part should be **uploaded separately, but submitted together**.

4.11 **A responsive proposal will include the following completed documents**:

- **Narrative/technical Proposal**
- **Cost Proposal**
- **Required City Forms** shall be one separate file and uploaded separately from the technical/narrative and cost proposals on the general attachment tab in PlanetBids:
  - Attachment A – Compliance with the Terms and Conditions of the RFP, signed with any exceptions noted
  - Attachment C – Statement of Non-Collusion, signed and dated
  - Attachment D – Debarment, Suspension, Ineligibility and Voluntary Exclusion Certificate, signed and dated
  - Attachment E – W-9 Request for Taxpayer Identification Number and Certification and Vendor Application Form
  - Attachment F – Secretary of State Registration. Contractors must be registered with the California Secretary of State prior to contract execution. Submission of Attachment F with the proposal is not mandatory; however, if the Contractor has already filed, it may be uploaded as a general attachment.
  - Attachment G – Equal Benefits Ordinance (EBO) Form, completed, signed and dated.
  - Attachment H – Insurance Requirements, signed and dated.
  - Addenda (if applicable)
- **Financial Documentation/Statements** – See Section 9.

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5. PROPOSAL EVALUATION AND AWARD PROCESS

5.1 Proposals shall be consistently evaluated based upon the following criteria:
- 5.1.1 Demonstrated competence;
- 5.1.2 Experience in performance of comparable engagements;
- 5.1.3 Expertise and availability of key personnel;
- 5.1.4 Financial stability.
- 5.1.5 Conformance with the terms of this RFP; and
- 5.1.6 Reasonableness of cost.

5.2 Proposals shall be kept confidential until a contract is awarded.

5.3 The City may also contact the references provided in response to Section 9.3; contact any Contractor to clarify any response; contact any current users of a Contractor's services; solicit information from any available source concerning any aspect of a proposal; and seek and review any other information deemed pertinent to the evaluation process. The City shall not be obligated to accept the lowest priced proposal, but shall make an award in the best interests of the City of Long Beach.

5.4 The City reserves the right to request clarification of any proposal term from prospective Contractors.

5.5 Selected Contractor(s) will be notified in writing. Any award is contingent upon the successful negotiation of final contract terms. Negotiations shall be confidential and not subject to disclosure to competing Contractors unless and until an agreement is reached. If contract negotiations cannot be concluded successfully, the City reserves the right to negotiate a contract with another Contractor or withdraw the RFP.

5.6 Any contract resulting from this RFP shall not be effective unless and until approved by the City Council / City Manager, as applicable.

6. PROTEST PROCEDURES

6.1 Who May Protest

Only a Proposer who has actually submitted a proposal is eligible to protest a contract awarded through a Request for Proposals (RFP). A Proposer may not rely on the protest submitted by another Proposer but must pursue its own protest.

6.2 Time for Protest

The City will post a notice of the intent to award a contract at least ten (10) business days before an award is made. The notice will be available to all Proposers who submitted a proposal via the City's electronic bid notification system at http://www.longbeach.gov/purchasing/default.asp. A Proposer desiring to submit a protest for a proposal must do so within five (5) business days of the electronic notification of intent to award. The City Purchasing Agent must receive the protest by the close of business on the fifth (5th) business day following posting of notification of intent to award the contract. Proposers are responsible for registering with the City's electronic bid notification system and maintaining an updated Contractor profile. The City is not responsible for Proposers' failure to obtain notification for any reason, including but not limited to failure to maintain updated email addresses, failure to open/read electronic messages and failure of their own computer/technology equipment. The City's RFP justification memo will be available for review by protestors once the notification of intent to award has been posted via the City's electronic bid notification system.

6.3 Form of Protest

The protest must be in writing and signed by the individual who signed the proposal or, if the Proposer is a corporation, by an officer of the corporation, and addressed to the City Purchasing Agent. Protests may be submitted via US Mail, or email, and must include a valid email address, street address and phone number sufficient to ensure that the City's decision concerning the protest will be received. Protests must set forth a complete and detailed statement of the grounds for the protest and include all relevant information to support the grounds stated, and must refer to specific portions of the RFP and attachments upon which the protest is based. Once the protest is received by the City Purchasing Agent, the City will not accept additional information on the protest unless the City requests it.

6.4 City Response to Protest

The City Purchasing Agent or designee will respond with a decision regarding the protest within five (5) business days of receipt of protest by email or US Mail to the address provided in the protest. This decision shall be final.

6.5 Limitation of Remedy

The procedure and time limits set forth herein are mandatory and are the Proposer's sole and exclusive remedy in the event of a protest. The Proposer's failure to comply with these procedures shall constitute a waiver of any right to further pursue a protest, including filing a Government Code Claim or initiation of legal proceedings.

7. PROJECT SPECIFICATIONS

A. General Requirements

1. Contractor shall ensure that all equipment, materials, supplies, and consumables meet or exceed all applicable manufacturer's published specifications and industry standards for the required work.
2. Contractor shall use only brand new, factory-sealed products unless City Technology and Innovation Department Manager or designee authorizes otherwise.
3. Please note that detailed product requirements are stated throughout the Specifications and Scope of Work section.

B. Safety Requirements

1. General Requirements
    1) Please note that it is the Contractor's responsibility to be fully self-informed regarding all legal and industry standard requirements regarding all applicable safety requirements enforce at the time of work being done.
    2) Contractor shall exercise all necessary and reasonable precautions regarding safety of persons and property in performance of the contract requirements and while on site.
2. Firestops Requirements
    1) Prior to installing the firestop, and in coordination with the ISM, Contractor shall develop a drawing of all proposed firestops, clearly identifying all components that would breach the firestop.
    2) Contractor shall ensure that the appropriate firestop system is installed according to the manufacturer's specifications and all legal requirements.
    3) Contractor shall seal all partial or complete penetrations through any fire-rated building structures including walls, floors, and ceilings with an appropriate firestop system.
    4) Contractor shall ensure that all penetrating items including without limitation: riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. are properly fire-stopped.
    5) The fire-stopping shall meet the requirements of the National Electric Code, and all Federal, State, and local codes. In the event of conflict, the more stringent fire-stopping requirement shall prevail.
    6) Contractor shall remedy, at contractor's sole expense, any defective installed firestop systems to the satisfaction of the City's inspector.

C. Environmental Requirements

1. Contractor shall comply with all current applicable local, state, and federal requirements.
2. Contractor shall transport, store, apply, and dispose of hazardous materials as required by law.
3. Contractor shall ensure that all appropriate measures are taken to fully protect all persons and adjacent areas before, during, and after work including that are in, near, or within possible sphere that could be affected by work.
4. Contractor shall remove from the work site and properly dispose of all spent materials, hazardous materials, debris, and the like on a daily basis. Do NOT accumulate waste materials unless City Technology and Innovation Department Manager or designee authorizes otherwise.
5. Contractor shall not reuse any removed materials unless City Technology and Innovation Department Manager or designee authorizes otherwise.
6. Contractor shall contain, containerize where applicable, and minimize or eliminate wastes, spills, residues, hazardous materials, and fumes at the jobsite.

D. Security Requirements

1. Contractor shall not admit any unauthorized person into the work area.
2. Contractor shall furnish and wear identification at all times.

E. Protecting Areas

1. Contractor shall protect all persons and property in, near, or within possible sphere of the work.
2. Contractor shall remove the protective materials immediately after the final work has been completed in a given project area.
3. Contractor shall be responsible for all work, materials, and equipment as they are under Contractor's care, custody, and control until project acceptance by City.

F. Damage Control

1. Contractor shall protect materials, products, facilities, and the like from damage at all times.
2. Contractor shall make repairs, at Contractor's sole expense, for Contractor-attributed damages within 24 hours of the damage occurrence; contractor's failure to make repairs with time allowance, may cause City to affect repairs and charge back Contractor or deduct from invoices due, the repair costs, plus an administrative charge.

G. Delivering and Staging of Equipment and Materials

1. Contractor shall deliver all materials in the original, unopened containers with the manufacturer's name, labels, product identification, and batch numbers.
2. Contractor shall remove damaged material from the site and replace immediately.
3. Contractor shall store, at Contractor's sole risk, materials, and equipment, needed for the project. Store all materials off the ground. Protect from rain, freezing or excessive heat.
4. Contractor shall stage material on the site to ensure uninterrupted progress of the work.
5. Contractor shall remove all materials, tools, and equipment immediately after work is completed.

H. Industry Standards and Applicable Documents

1. The cabling system described in this specification is derived in part from the recommendations made in industry standard documents. The referenced documents below, or their latest revisions, are incorporated herein by reference.
   - A) The Data Drop Specification, associated drawings
   - B) ANSI/TIA/EIA-568-B, Commercial Building Telecommunications Cabling Standard
   - C) TIA/TSB-140, Additional Guidelines For Field-Testing Length, Loss And Polarity Of Optical Fiber Cabling Systems
   - D) ANSI/TIA/EIA 568-B.2-1, Performance Specification for 4-Pair 100 Ohm Category 6 Cabling
   - E) ANSI/TIA/EIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces
   - F) ANSI/TIA/EIA-606-A, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
   - G) ANSI/J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   - H) Building Industries Consulting Services International (BICSI) Telecommunications Distribution Methods Manual (TDMM) – 10th edition
   - I) National Fire Protection Agency (NFPA) – NFPA 70, National Electrical Code (NEC) – 2002
2. Please note, that in the event of a conflict between applicable documents, the order of the list above shall dictate the order of precedence in resolving conflicts.
3. Please note that in the event a conflict exists between this document and any of the documents listed above are in conflict, the more stringent requirement shall apply. Contractor shall adhere to the most recent version available.

Specific Requirements

I. Site Conditions:

1. Please note that any given site's conditions will vary significantly from location to location, floor to floor, and time to time; various working conditions exist, but generally the areas are office spaces and may be occupied by City employees and the Public; environmental conditions will vary for each location.
2. Contractor shall inspect each site prior to providing subsequent quotations to ensure that you have factored in all of the requirements.
3. Contractor's submission of a bid constitutes acknowledgment of the site conditions requirements and that you have incorporated this condition into your bid.
4. Installation equipment, materials, and product will ONLY be allowed to be kept in specified areas. Hallways, office areas lobbies etc. are not suitable for storage and the City will NOT be held liable for missing or stolen equipment.
5. Contractor will exercise reasonable care to avoid damaging City facilities and is responsible for timely repair of damage to City facilities due to carelessness of their workmen. The Contractor must immediately report to the City any damage to the facility that may exist or may occur during the occupancy of the quarters.
6. At the end of each shift or workday, Contractor will be required to remove trash, debris, spent reels, and all other refuse related to this installation and at a minimum broom clean work areas Contractors are to supply their own tools and equipment, especially brooms, dustpans, ladders etc. Upon completion of the work, the Contractor must remove all tools, equipment and rubbish and debris from the premises and must leave the premises clean and neat.
7. Contractor will obtain the City's permission before cutting into or through any part of the building structure such as beams, girders, concrete, or tile floors, partitions and ceilings.
8. Contractor must provide protection to prevent dust from migrating from the work area into other areas of the building e.g. provide a temporary structure/enclosure is to be erected to contain all indoor core-boring locations, for any work that will cause noticeable dust near work areas, e.g. indoor core-boring. Timely cleanup of debris related to boring is the responsibility of the contractor. Work area is to be cleaned and returned to an "as found" condition. This will include but not be limited to water control and abatement, floor washing, vacuuming, carpet cleaning, furniture dusting, furniture cleaning and furniture washing by a professional cleaning service as needed.

J. Working Days and Hours

1. Contractor shall coordinate work schedules with the assigned City Technology and Innovation Department Manager or designee and perform work only during approved days and times.

2. Contractor shall perform the work on non-City holidays, Monday through Friday, 7:00 a.m. to 4:30 p.m.; contractor must vacate the premises by 5:00 p.m. each day; unless City requests otherwise.
3. Contractor shall perform the work, if City requires, during days and or times other than above at the same material costs, but at the overtime rates as indicated on the price sheet; contractor must vacate the premises as indicated by the City Technology and Innovation Department Manager or designee.
4. Contractor shall minimize interruptions to the City operations during work performance; perform work after-hours on holidays and/or weekends as-needed.
5. Contractor shall perform work, if City requires, during days and or times other than above, at the same material costs, including applicable overtime rates.

K. Special Safety Requirements

1. Cutting, Boring, Grinding
   - A) Contractor must obtain City Technology and Innovation Department Manager or designee's permission before cutting, boring, or grinding any part of the building structure.
   - B) Contractor shall provide all required protection equipment and materials including but not limited to a temporary structure/enclosure to prevent dust migration into other areas of the building resulting from work performance.
   - C) Contractor shall ensure that all affected work areas are clean and returned to their pre-work condition.

L. Cabling

1. Cabling shall include but not be limited to, cabling (e.g. CAT 6/6A, 25/50/100 pair voice cable etc.), patch panels, voice and data outlets, conduit, equipment racks and ladders, 66 and 110 punch down block, testing, labeling and documenting.
2. Contractor shall perform work in strict compliance with all applicable Project Specifications listed herein.
3. Contractor must adhere to any applicable Federal, State and Local laws, codes and regulations.
4. The City's buildings have a wide variation of ages and construction methods, so cable routes transition through various spaces such as, but not limited to, hard-lid and suspended ceilings, under floors, through walls of various construction. Cabling must be routed efficiently, but also neatly, using existing cable routes.
5. Contractor shall ensure that the allowable bend radius specified for Category 6/6A cable is not exceeded.
6. Contractor shall ensure that the allowable bend radius specified for Fiberoptic cabling/jumpers is not exceeded.

7. Contractor shall coil cable, as appropriate, in either the box at the termination point or the ceiling above or below the drop location.

8. Contractor shall maintain the cable jacket as close as reasonably possible to the termination point.

9. Contractor shall avoid cable splices unless absolutely necessary. City must give written approval for any splicing and reserves the right to reject any splicing request. If splicing is allowed, Contractor will ensure that any required cable splices are in accessible locations and housed in an enclosure intended and suitable for the purpose.

10. Contractor shall support cable bundles with a J-hook or trapeze system for all horizontal cables at four foot intervals maximum using Stiffy or Pencil rods; ensure that cables do not rest on acoustic ceiling grids or panels.

11. Contractor shall ensure that cable is installed above all fire sprinklers; not attached to any ancillary equipment or hardware; does not interfere with any valves, fire alarm conduit, boxes, or other control devices; is not attached to ceiling grid or lighting support wires.

12. Contractor shall install clips to properly support the cabling.

13. Contractor shall provide Ten-foot (10') cat 6 patch cables for each workstation And 3 ft cat 6A for AP's

14. Contractor shall provide cross-connect cables between patch panels and network equipment, divide total numbers of cables pulled into three (3) different lengths. Two-foot (2') patch cables, Three-foot (3') patch cables and Four-foot (4') ComScope low density patch cables.

15. Contractor shall ensure that 4" minimum diameter conduits are used in all closets. If a different size conduit is needed the vendor must give written request to the City and the City reserves the right to reject any request.

16. Contractor shall ensure that all data backbone conduits are located adjacent to the racks.

17. Contractor shall ensure that all voice conduits are located adjacent to the voice termination fields.

18. Contractor shall provide ladders and wall mount management rings to ensure proper support and dress cables from conduits to racks and frames.

19. Contractor shall not exceed the recommended pulling tension of the cable manufacturer. Any cable that exhibits evidence of cuts, crimps, severe abrasions, and damage due to exceeding the manufacturer's specified pulling tension shall be replaced at the contractor's expense.

20. Contractor shall install, dress, and terminate all station cabling in a professional manner, using practices of good craftsmanship.

21. Where communications cabling must cross power cables/conduits, they shall cross at right angles (90-degrees) to the power runs. A 12-inch minimum separation between

power cables/conduits and communications cabling shall be maintained when following the same route.

22. Grounding of all equipment racks shall be installed in accordance with all manufacturer's specifications and recommendations, the National Electrical Code, and accepted industry standards for grounding communications cable and ancillary devices.

23. All work must be approved and coordinated by the assigned City Technology and Innovation Department Manager or his/her designate. Any work that has a potential to disrupt normal City operations, shall be scheduled and performed so as to minimize work interruptions, including performing work after-hours on holidays and/or weekends.

24. Contractor must remove all old cabling from workstation back to communication room were the new cabling is installed.

M. Material

1. Copper: Furnish only SYSTIMAX GigaSpeed XL 2071e category 6 plenum rated Gray for data and Blue for voice cabling and SYSTIMAX GigaSpeed X10D category 6A for Access Points (WIFI) for use on this procurement; there are NO substitutions on this procurement, and NO alternate bids will be considered. See parts list, Section 7(M)(8).

2. Fiber: Shall include but not be limited to Corning ALTOS Fast Access Tight-Buffered cable plenum (Indoor), ALTOS Fast Access Tight/Loose-Buffered Cable (Outdoor) or **12 SM STRAND FREEDOM ONE OSP** for use on this procurement. Suitable equivalent fiber cables manufacturers are acceptable at the City's discretion and must be approved.

3. City will accept only first quality "New" equipment and materials for installation under this bid. Equipment and materials must not be used, pre-owned, returned, remanufactured, reconditioned or have had its serial numbers registered as sold to a previous customer or vendor. The City reserves the right to verify origin and condition of all equipment and materials at any time.

4. Contractor shall furnish connectivity items including without limitation modular jacks, inserts, splices, modular patch panels, and the like, which are fully compatible with and meet or better then manufactures listed above specifications and warranty requirements.

5. Contractor shall furnish all other components required to complete the project that meet or better then manufactures listed above requirements to ensure that the warranty is not voided and is intact.

6. Contractor shall bid all or none (no exclusions).

7. If awarded, when providing quotes on actual jobs, if items are not listed on the Bid Line Items, Contractor shall show manufacturer's list price, so we can apply your quoted discount and calculate item price to the City. Pricing should include consumables, such as screws, washers, etc. necessary to complete the requirements of the given jobs, in all subsequent quotations.

8. Parts list

The contractor shall provide electrical, telecommunications, security, networking, energy management, and lighting products. This includes, but is not limited to, the parts identified on the list below:

MATERIAL DESCRIPTION	MAN	PART NO.
2071e CAT6 BLUE CMP	SYSTIMAX	700208093
1071e CAT6 BLUE CMR	SYSTIMAX	760004689
1571 BK4 CAT6 OSP BLACK	SYSTIMAX	760008888
CAT 6 INSERT ORANGE	SYSTIMAX	700206683
CAT 6 INSERT BLUE	SYSTIMAX	700206758
CAT 6 INSERT GRAY	SYSTIMAX	700206733
4 PORT FACE PLATE	SYSTIMAX	108168543
2 PORT SMB WHITE	SYSTIMAX	107984056
3 PORT FURNITURE PLATE WHITE	SYSTIMAX	106650898
WHITE BLANK INSERTS 100 PK	SYSTIMAX	107067928
24 PORT PATCH PANEL CAT6 ANGLED	SYSTIMAX	760151308
48 PORT PATCH PANEL CAT6 ANGLED	SYSTIMAX	760151753
12 PORT WALL MOUNTED CAT6 PP	UNIPRISE	760183079
2U WALL MOUNTED BRACKET	LEVITON	49251-W62
CAT6 PATCH CORD 3 FOOT BLUE	SYSTIMAX	CPC3312-0ZF003
CAT6 PATCH CORD 5 FOOT BLUE	SYSTIMAX	CPC3312-0ZF005
CAT6 PATCH CORD 7 FOOT BLUE	SYSTIMAX	CPC3312-0ZF007
CAT6 PATCH CORD 9 FOOT BLUE	SYSTIMAX	CPC3312-0ZF009
CAT6 RDC PATCH CORD 3 FOOT BLUE	SYSTIMAX	CO166S2-0ZF003
CAT6 RDC PATCH CORD 5 FOOT BLUE	SYSTIMAX	CO166S2-0ZF005
CAT6 RDC PATCH CORD 7 FOOT BLUE	SYSTIMAX	CO166S2-0ZF007
CAT6 RDC PATCH CORD 9 FOOT BLUE	SYSTIMAX	CO166S2-0ZF009
2091 CAT6AA22:F53 CABLE CMP BLUE	SYSTIMAX	760107201
1091 CAT6A CABLE CMR BLUE	SYSTIMAX	760107094
CAT6A CABLE OSP BLACK	SYSTIMAX	760178129
6A INSERT ORANGE	SYSTIMAX	760092379
24 PORT INSERT STYLE PATCH PANEL ANGLED	SYSTIMAX	760151290
CAT6A PATCH CORD 3 FOOT BLUE	SYSTIMAX	CPCSSX2-0ZF003
CAT6A PATCH CORD 5 FOOT BLUE	SYSTIMAX	CPCSSX2-0ZF005
CAT6A PATCH CORD 7 FOOT BLUE	SYSTIMAX	CPCSSX2-0ZF007
CAT6A PATCH CORD 9 FOOT BLUE	SYSTIMAX	CPCSSX2-0ZF009
CAT6A RDC PATCH CORD 3 FOOT BLUE	SYSTIMAX	CO199K2-0ZF003

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

MATERIAL DESCRIPTION	MAN	PART NO.
CAT6A RDC PATCH CORD 5 FOOT BLUE	SYSTIMAX	CO199K2-0ZF005
CAT6A RDC PATCH CORD 7 FOOT BLUE	SYSTIMAX	CO199K2-0ZF007
CAT6A RDC PATCH CORD 9 FOOT BLUE	SYSTIMAX	CO199K2-0ZF009
25 PAIR CMP	SYSTIMAX	760103044
25 PAIR CMR	SYSTIMAX	760182907
25 PAIR OSP	ESSEX	51-499-EL
24 PORT CAT5E PATCH PANEL ANGLED	SYSTIMAX	760056580
CAT5E PATCH CORD 3 FOOT BLUE	SYSTIMAX	CPC6642-0ZF003
CAT5E PATCH CORD 5 FOOT BLUE	SYSTIMAX	CPC6642-0ZF005
CAT5E PATCH CORD 7 FOOT BLUE	SYSTIMAX	CPC6642-0ZF007
CAT5E PATCH CORD 9 FOOT BLUE	SYSTIMAX	CPC6642-0ZF009
WALL RACK 24X24X19	CPI	11790-725
WALL RACK 36X24X19	CPI	11791-725
2 POST RACK	CPI	55053-703
4 POST RACK	CPI	15215-703
6 INCH DBLE SIDED VERT. MAN	CPI	35521-703
2U WIRE MANAGER	CPI	35441-702
12 INCH LADDER RACK	CPI	10250-712
12 STRAND SM ALTOS Fast Access PLENUM	CORNING	012ZU4-T4F22D20
24 STRAND SM ALTOS Fast Access PLENUM	CORNING	024ZU4-T4F22D20
48 STRAND SM ALTOS Fast Access PLENUM	CORNING	048ZU4-T4F22D20
WALL MOUNT FIBER PANEL	CORNING	WCH-02P
1U RACK MOUNT FIBER PANEL	CORNING	CCH-01U
4U RACK MOUNT FIBER PANEL	CORNING	CCH-04U
12 PORT SM COUPLER PANEL	CORNING	CCH-CP12-A9
24 PORT SM COUPLER PANEL	CORNING	CCH-CP24-A9
LC SM CONNECTOR	CORNING	95-200-99
LC/LC SM PATCH CORD 2 METER DUPLEX	CORNING	040402R5120002M
LC/LC SM PATCH CORD 3 METER DUPLEX	CORNING	040402R5120003M
LD5 8 FOOT STICK	PANDUIT	LD5WH8-A
LD5 RIGHT ANGLE FITTING	PANDUIT	RAFC5WH-X
LD5 INSIDE CORNER	PANDUIT	ICFC5WH-X
LD5 COUPLER	PANDUIT	CFX5WH-X
LD5 ENTRANCE FITTING	PANDUIT	DCF5WH-X
MISC. HARDWARE, HANGERS, SUPPORTS	Include on Separate Attachment	Include on Separate Attachment

N. Terminating

1. Contractor shall terminate the connections all work areas, other than the Communications room, with Category 6/6A, RJ45 modular inserts that have data inserts that are Orange in color and the voice inserts that are Blue in color.
2. Contractor shall ensure that the inserts are placed in a 4 or 6 -port white faceplate for hard wall installations and in surface-mounted boxes attached to the bottom of the kick plate for workstation installations.
3. Contractor shall terminate the Category 6 cable, in the Communications room, on the new 48-port patch panels, Category 6A cable, in the Communications room, on the new 24 PORT INSERT STYLE PATCH PANEL ANGLED

O. Labeling

1. Contractor shall adhere to existing labeling scheme, or if none, develop a labeling scheme, with unique identifiers for each cable in the system, in coordination with the assigned City Technology and Innovation Department Manager or designee, clearly identifying all components of the system including without limitation: the faceplates, patch panels, blocks, and cables according to the corresponding jack number and labeling scheme.
2. Contractor shall implement the labeling scheme without deviation; bring any unavoidable deviations to the attention of the ISM for consideration.
3. Contractor shall utilize a P-Touch printed labeling system or equivalent.
4. Contractor shall update the labeling scheme as changes are made.
5. Contractor shall ensure that the labeling scheme is documented according to the Documentation section below.

P. Testing

1. Test Equipment:
   - A) Contractor must ensure that all test equipment meets or betters the cable manufacturer's requirements and is approved by the ISM prior to use.
   - B) Contractor must ensure that all calibrations of the test equipment are up-to-date prior to use.
   - C) Contractor must ensure that all persons utilizing the test equipment are fully trained on its use.
2. Testing:
   - A) Contractor must test all installed components according to the cable manufacturer's requirements and approved by the ISM.
   - B) All Category 6/6A station cables shall be tested and certified for compliance with the proposed standards for EIA/TIA Category-6 cabling.

C) Contractor must retest any failures of tests at contractor's sole expense.

D) Any cable failing shall be replaced at Contractor's expense.

E) Please note: payment will be withheld until all components have passed all tests satisfactorily.

F) Contractor shall provide a printed or electronic copy of the test results of the newly installed category 6/6A and Fiber cables and termination points to the ISM or designee within two business days after the tests have been completed. The test results shall include the following minimum tests:

1) Date of test.
2) Length
3) Propagation Delay
4) Delay Skew
5) Impedance
6) Attenuation
7) Tester manufacturer, model, serial number, hardware and software versions
8) Insertion Loss
9) Pair-to-Pair Near End Crosstalk (NEXT)
10) Power Sum Near End Crosstalk (PSNEXT)
11) Equal Level Far End Crosstalk (ELFEXT)
12) Power sum Equal Level Far End Crosstalk (PSELFEXT)
13) Return Loss
14) Shield Continuity
15) The most up-to-date requirements as promulgated
16) Db loss

G) Please note that a PASS test is considered 100% passing all testing requirements and a FAIL test is considered anything less than 100%. City reserves the right to observe any part of the cabling process, including testing of cabling.

H) Please note that all test results must ultimately pass to the satisfaction of all pending warranty requirements.

Q. Documenting:

1. Contractor must upload electronic versions of the documentation for this RFP to PlanetBids, in PDF format that:

A) Contractor must includes major heading tabs: Test Calibration.

B) Contractor must include sections with the major heading tabs: by test types.

C) Contractor must ensure that the failed tests and the related pass tests are in succession.

D) Contractor must provide documentation of the test equipment used by name, manufacturer, model number, last calibration date.

E) Contractor must use PDF format or other requested format.

F) Contractor must provide the documentation within three calendar weeks after the completion of the project for review by the ISM.

G) Contractor must provide and upload subsequent documentation updates (annotate version and date) for a given project by a means acceptable to the ISM.

2. Contractor must provide the documentation within three calendar weeks after the completion of the project for review by ISM.

R. Drawings

1. Contractor shall develop a central drawing set to be uploaded in PlanetBids for this RFP in CAD, VISIO, PDF or other requested format, with unique identifiers for each cable in the system, in coordination with the Information Systems Manager (ISM) or designee clearly identifying all components of the system including without limitation: the faceplates, patch panels, blocks, and cables according to the corresponding jack number and labeling scheme.
2. Contractor shall upload a central drawing set at the conclusion of each project in PDF, or other requested format.
3. Contractor shall depict the as-built status of the system in the drawings.
4. Contractor shall update the drawings as changes are made – include Version and Date details.
5. Contractor shall ensure that the most up-to-date labeling scheme is incorporated into the drawings.
6. Contractor shall include narratives describing any areas of difficulty encountered during the installation that could potentially cause problems to the telecommunications systems or other components.

(END OF SPECIFICATIONS)

8. WARRANTY/MAINTENANCE AND SERVICE

1. Contractor must warrant, for a minimum of one year from the date of acceptance, all work including labor and materials at contractor's sole expense.

2. Contractor shall submit all documentation to support the warranty in accordance with all manufacturers' warranty requirements.

3. Contractor shall perform all in-warranty work within seven (7) calendar days after written notification from City representative and at contractor's sole expense.

4. Contractor shall facilitate a 25-years performance warranty to be established between the City of Long Beach and the manufacturer.

5. Contractor shall provide an extended 25-years warranty for all components used in the installation from the date of acceptance.

9. COMPANY BACKGROUND AND REFERENCES

9.1 Primary Contractor Information

Contractors must provide a company profile. Information provided shall include:

- Company ownership. If incorporated, the state in which the company is incorporated and the date of incorporation. An out-of-state Contractor must register with the State of California Secretary of State before a contract can be executed (http://www.sos.ca.gov/business/).
- Location of the company offices.
- Location of the office servicing any California account(s).
- Number of employees both locally and nationally. Specify the number of full time and part-time employees residing in Long Beach.
- Location(s) from which employees will be assigned.
- Name, address and telephone number of the Contractor's point of contact for a contract resulting from this RFP.
- Company background/history and why Contractor is qualified to provide the services described in this RFP.
- Length of time Contractor has been providing services described in this RFP to the **public and/or private sector**. Please provide a brief description.
- Resumes for key staff to be responsible for performance of any contract resulting from this RFP.
- Financial Stability: Contractors must provide financial statements giving the City enough information to determine financial stability. These statements may include, but are not limited to:

  a) Financial Statement or Annual Report;
  b) Business tax return;
  c) Statement of income and related earnings;

The level and term of documentation required from the proposer to satisfy the City will be commensurate with the size and complexity of the contract and proposers should submit accordingly. If the information submitted by the Contractor, or available from other sources, is insufficient to satisfy the City as to the Contractor's contractual responsibility, the City may request additional information from the Contractor or may deem the proposal non-responsive. The City's determination of the Contractor's responsibility, for the purposes of this RFP, shall be final.

9.2 Subcontractor Information

9.2.1 Does this proposal include the use of subcontractors?

Yes _____ No X Initials EF

If "Yes", Contractor must:

9.2.1.1 Identify specific subcontractors and the specific requirements of this RFP for which each proposed subcontractor will perform services.

9.2.1.2 Provide the same information for any subcontractors as is indicated in Section 9.1 for the Contractor as primary contractor.

9.2.1.3 References as specified in Section 9.3 below must also be provided for any proposed subcontractors.

9.2.1.4 The City requires that the awarded Contractor provide proof of payment of any subcontractors used for this project. Proposals shall include a plan by which the City will be notified of such payments.

9.2.1.5 Primary contractor shall not allow any subcontractor to commence work until all insurance required of subcontractor is obtained.

9.3 References

Contractors should provide a minimum of five (5) references from similar projects performed for state and/or large local government clients within the last three years. Information provided shall include:

- Client name;
- Project description;
- Project dates (starting and ending);
- Staff assigned to reference engagement that will be designated for work per this RFP;
- Client project manager name and telephone number.

9.4 Business License

The Long Beach Municipal Code (LBMC) requires all businesses operating in the City of Long Beach to pay a business license tax. In some cases, the City may require a regulatory permit and/or evidence of a State or Federal license. Prior to issuing a business license, certain business types will require the business license application and/or business location to be reviewed by the Development Services, Fire, Health, and/or Police Departments.

For more information, go to www.longbeach.gov/finance/business_license.

10. COST

Consistent with Section 4.10, the cost proposal is to be a separate document.

10.1 Contractors must provide a detailed fixed price schedule, including out-of-pocket expenses, for all costs associated with the responsibilities and related services indicated herein. Clearly specify the nature of expenses anticipated and the amount of each category for out-of-pocket expenses.

10.1.1 Include a Price schedule for services encompassed within this Structured cabling RFP.

10.2. Contractors proposing on the Application-Specific Services must specify the hourly rates for each classification of resource (e.g. Project Manager, Sr. Consultant, Consultant, DBA, etc.) in the format specified by the following table:

Name of application to be supported:		
Resource Type	**On-site hourly rate**	**Off-site hourly rate (inclusive of travel/expenses)**
see cost proposal		

10.3 Contractors proposing on the General IT Services must provide the following:

10.3.1 Provide the percentage markup for pass through staff.

10.3.2 Provide sample hourly rates using existing resources for each of the positions listed in Exhibit A using the format specified in the following table:

Resource Type	**On-site hourly rate**	**Off-site hourly rate (inclusive of travel/expenses)**
see cost proposal		

10.4 Contractors proposing on the Project-Specific Services must specify hourly rates for project staff using the format specified in the following table:

Resource Type	On-site hourly rate	Off-site hourly rate (inclusive of travel/expenses)
see cost proposal		

11. BONDS

11.1 Labor and Materials Bond

The Contractor shall submit a Labor and Materials Bond to the City Purchasing Agent, Long Beach City Hall, 411 West Ocean Blvd., Plaza Level, Long Beach, California 90802, if the total contract amount is more than $25,000.00. The amount of the bond shall be (Contractor shall complete) 100 percent of the Contract amount and shall be submitted within ten (10) calendar days after notice of award. The Bond shall be submitted upon forms included herein or secured at the Office of the City Purchasing Agent (address above).

A corporation must have the bond executed by two (2) authorized officers. If the bond is executed by only one (1) authorized officer or a person not listed in section 313 of the California Corporations Code, then the corporation must attach a certified copy of a resolution of its Board of Directors authorizing execution by said individual(s).

12. ADDITIONAL REQUIREMENTS FROM FUNDING SOURCE

Any Contract arising from this procurement process may be funded in whole or in part by various granting entities. Pursuant to said grants, the Awarded Consultant is required to comply with (and to incorporate into its agreements with any sub-consultants) the following provisions in the performance of the Contract, as applicable.

12.1 Order of Precedence – In the event of conflicts or discrepancies between these Federal grant funding provisions and any other Contract document, the Federal grant provisions shall take precedence.

12.2 Access to Contractor's Records – The Awarded Contractor shall provide the City, the Office of State and Local Government Coordination and Preparedness, the Comptroller General of the United States, or any of their authorized representatives, access to any books, documents, papers, and records of the Awarded Contractor which are directly pertinent to the work performed under the Contract for the purposes of making audit, examination, excerpts or transcriptions.

12.3 Americans with Disabilities Act – The Awarded Contractor hereby certifies that it will comply, as applicable, with the Americans with Disabilities Act of 1990 ("ADA"), 42

USC §§ 12101 et seq., and its implementing regulations, including Subtitle A, Title II of the ADA. The Awarded Contractor will provide, as applicable, reasonable accommodations to allow qualified individuals with disabilities to have access to and to participate in its programs, services and activities in accordance with the provisions of the ADA. The Awarded Contractor will not discriminate against persons with disabilities nor against persons due to their relationship to or association with a person with a disability. Any contract entered into by the Awarded Contractor (or any subcontract thereof), relating to this Agreement, shall be subject to the provisions of this paragraph.

12.4 Compliance with Contract Work Hours and Safety Standard Act – The Awarded Contractor shall comply with the requirements of §§ 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C §§ 327-330) as supplemented by Department of Labor regulations (29 CFR Part 5).

12.5 Compliance with Copeland "Anti-Kickback" Act – The Awarded Contractor shall comply with the requirements of the Copeland "Anti-Kickback" Act (18 U.S.C. § 874) as supplemented in the Department of Labor regulations (29 CFR Part 3).

12.6 Compliance with Davis-Bacon Act – The Awarded Contractor shall comply with the requirements of the Davis-Bacon ACT (40 U.S.C. §§ 276 to 276-a7) as supplemented by Department of Labor regulations (29 CFR Part 5) where applicable and shall provide the City with all applicable payroll records on a weekly basis.

12.7 Copyright – The Awarded Contractor acknowledges the existence of requirements and regulations of the awarding Federal agency relating to copyrights and right in data, including, but not limited to those set forth in 44 CFR Part 13.34 which states: "The Federal awarding agency reserves royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, and to authorize others to use, for Federal Government purposes: (a) The copyright in any work developed under a grant, subgrant, or contract under a grant or subgrant; and (b) Any rights of copyright to which a grantee, subgrantee or a contractor purchases ownership with grant support." The Awarded Contractor shall comply with 25 CFR 85.34.

12.8 Drug-Free Workplace – The Awarded Contractor hereby certifies that it shall provide or shall continue to provide a drug-free workplace as required by the Drug-Free Workplace Act of 1988 (41 U.S.C. § 701), and implemented at 44 CFR Part 17.

12.9 Energy Efficiency – The Awarded Contractor shall comply with all mandatory standards and policies relating to energy efficiency that are contained in the State of California's energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L.94-163, 89 Stat. 871).

12.10 Environmental Legislation – The Awarded Contractor shall comply with all applicable standards, orders or requirements issued under § 306 of the Clean Air Act (42 U.S.C.

1857 (h)), § 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR Part 15).

12.11 System for Award Management (SAM) – In accordance with Executive Orders 12549 and 12689 concerning suspension and debarment, contracts must prohibit contractors from awarding any subcontract to persons (individuals or organizations) listed as having an active exclusion of the Federal System for Awards Management Database (www.sam.gov).

12.12 Minority, Women and Other Business Enterprise Outreach – In accordance with CalEMA/Grantor directives, as applicable, firms who represent small business enterprises (SBEs), minority business enterprises (MBEs) and women business enterprises (WBEs) are encouraged to participate in competition for this opportunity. Any such enterprise shall include the appropriate SBE/MBE/WBE certification along with its proposal. The Awarded Contractor agrees that, to the extent contractors or subcontractors are utilized, the Awarded Contractors shall use small, minority, women-owned, or disadvantaged business concerns and contractors or subcontractors to the extent practicable and shall take the affirmative steps as set forth in 49 CFR §13.36(e).

12.13 National Preservation Acts – The Awarded Contractor shall assist City (if necessary) in assuring compliance with § 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470), Executive Order 11593 (identification and protection of historic properties), the Archeological and Historical Preservation Act of 1974 (16 U.S.C. § 469 a-1 et seq.), and the National Environmental Policy Act of 1969 (42 U.S.C. § 4321).

12.14 Non-discrimination; Equal Employment Opportunity – The Awarded Contractor hereby assures the City that in performing its obligations pursuant to the Contract, it will comply with all applicable nondiscrimination requirements as set forth in 44 CFR Part 13.36. In addition, the Awarded Contractor shall comply with Executive Order 11246 of September 24, 1965, entitled "Equal Opportunity Employment," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR chapter 60), and where applicable to the nondiscrimination provisions of the Omnibus Crime Control and Safe Street Acts of 1968 (42 U.S.C. § 3789d), the Victims of Crimes Act (42 U.S.C. § 10604(e)), the Juvenile Justice and Delinquency Prevention Act (42 U.S.C. § 5672(b)), the Civil Rights Act of 1964 (42 U.S.C. § 2000d), the Rehabilitation Act of 1973 (29 U.S.C. § 794), the Americans with Disabilities Act of 1990 (42 U.S.C. §§ 12131-34), the Education Amendments of 1972 (20 U.S.C. §§ 1681, 1683, 1685-86), and the Age Discrimination Act of 1975 (42 U.S.C. §§ 6101-07), see Executive Order 13279 (equal protection of the laws for faith-based and community organizations). This provision must be incorporated by Awarded Contractor into any subcontract exceeding $10,000.

12.15 Patent Rights – The Awarded Contractor acknowledges the existence of requirements and regulations of the awarding Federal agency relating to patent rights with respect

to any discovery or invention which arises or is developed in the course or under this Contract, including, but not limited to those regulations and requirements set forth in 44 CFR Part 13.36. Any discovery or invention that arises during the course of this Contract shall be immediately reported to the Department's project management team. The awarding Federal agency shall determine how rights in the invention/discovery shall be allocated consistent with "Government Patent Policy" and 37 CFR Part 401.

12.16 Payments, Reports, Records, Retention and Enforcement – The Awarded Contractor acknowledges the requirements and regulations set forth in 44 CFR Parts 13.36 through 13.42 and 49 CFR Part 18 and agrees to cooperate with the City in order to allow the City to comply with said requirements. The Awarded Contractor shall retain all of its records relating to the project for a period of five (5) years after City makes final payment to the Awarded Contractor and all other pending matters are closed.

12.17 Publications – All publications created and/or published with funding under any contract arising from this RFP shall prominently contain the following statement: "This document was prepared under a grant from FEMA's Grant Programs Directorate, U.S. Department of Homeland Security. Points of view or opinions in this document are those of the author(s) and do not necessarily represent the official position or policies of FEMA's Grant Programs Directorate or the U.S. Department of Homeland Security."

12.18 Rights to Data – The Grantor and the City shall have unlimited rights or copyright license to any data first produced or delivered under this Agreement. "Unlimited rights" means the right to use, disclose, reproduce, prepare derivative works, distribute copies to the public and perform and display publicly, or permit others to do so; as required by 48 CFR 27.401. Where the data are not first produces under this Contract or are published copyrighted data with the notice of 17 U.S.C § 401 or 402, the Grantor acquires the data under copyright license as set forth in 48 CFR 27.404(f)(2) instead of unlimited rights (4 CFR 27.404(a)).

12.19 Rights to Use Inventions – City and all grantors and/or awarding Federal Agency shall have an unencumbered right, and a non-exclusive, irrevocable, royalty –free license, to use, manufacture, improve upon and all others to do so for all governmental purposes, any invention developed under the Contract.

13. TERMS, CONDITIONS AND EXCEPTIONS

13.1 This contract will be for a period of 24 months with three (3) one (1) year renewal options at the discretion of the City. The contract term will not exceed 60 months.

13.2 The City reserves the right to alter, amend, or modify any provisions of this RFP, or to withdraw this RFP, at any time prior to the award of a contract pursuant hereto, if it is in the best interest of the City to do so.

13.3 The City reserves the right to waive informalities and minor irregularities in proposals received.

13.4 The City reserves the right to reject any or all proposals received prior to contract award.

13.5 The City shall not be obligated to accept the lowest priced proposal, but will make an award in the best interests of the City of Long Beach after all factors have been evaluated.

13.6 Any irregularities or lack of clarity in the RFP should be brought to the Purchasing Division designee's attention as soon as possible so that corrective addenda may be furnished to prospective Contractors.

13.7 Proposals must include any and all proposed terms and conditions, including, without limitation, written warranties, maintenance/service agreements, license agreements, lease purchase agreements and the Contractor's standard contract language. The omission of these documents may render a proposal non-responsive.

13.8 Alterations, modifications or variations to a proposal may not be considered unless authorized by the RFP or by addendum or amendment.

13.9 Proposals which appear unrealistic in the terms of technical commitments, lack of technical competence, or are indicative of failure to comprehend the complexity and risk of this contract, may be rejected.

13.10 Proposals may be withdrawn by written or facsimile notice received prior to the proposal opening time.

13.11 The price and amount of this proposal must have been arrived at independently and without consultation, communication, agreement or disclosure with or to any other contractor, Contractor or prospective Contractor.

13.12 No attempt may be made at any time to induce any firm or person to refrain from submitting a proposal or to submit any intentionally high or noncompetitive proposal. All proposals must be made in good faith and without collusion.

13.13 Prices offered by Contractors in their proposals are an irrevocable offer for the term of the contract and any contract extensions. The awarded Contractor agrees to provide the purchased services at the costs, rates and fees as set forth in their proposal in response to this RFP. No other costs, rates or fees shall be payable to the awarded Contractor for implementation of their proposal.

13.14 The City is not liable for any costs incurred by Contractors prior to entering into a formal contract. Costs of developing the proposals or any other such expenses

incurred by the Contractor in responding to the RFP, are entirely the responsibility of the Contractor, and shall not be reimbursed in any manner by the City.

13.15 Proposal will become public record after staff proposes to award a contract unless the proposal or specific parts of the proposal can be shown to be exempt by law. Each Contractor may clearly label all or part of a proposal as "CONFIDENTIAL" provided that the Contractor thereby agrees to indemnify and defend the City for honoring such a designation. The failure to so label any information that is released by the City shall constitute a complete waiver of any and all claims for damages caused by any release of the information.

13.16 A proposal submitted in response to this RFP must identify any subcontractors, and outline the contractual relationship between the awarded Contractor and each subcontractor. An official of each proposed subcontractor must sign, and include as part of the proposal submitted in response to this RFP, a statement to the effect that the subcontractor has read and will agree to abide by the awarded Contractor's obligations.

13.17 The awarded Contractor will be the sole point of contract responsibility. The City will look solely to the awarded Contractor for the performance of all contractual obligations which may result from an award based on this RFP, and the awarded Contractor shall not be relieved for the non-performance of any or all subcontractors.

13.18 The awarded Contractor must maintain, for the duration of its contract, insurance coverages as required by the City. Work on the contract shall not begin until after the awarded Contractor has submitted acceptable evidence of the required insurance coverages.

13.19 Each Contractor must disclose any existing or potential conflict of interest relative to the performance of the contractual services resulting from this RFP. Any such relationship that might be perceived or represented as a conflict should be disclosed. The City reserves the right to disqualify any Contractor on the grounds of actual or apparent conflict of interest.

13.20 Each Contractor must include in its proposal a complete disclosure of any alleged significant prior or ongoing contract failures, any civil or criminal litigation or investigation pending which involves the Contractor or in which the Contractor has been judged guilty or liable. Failure to comply with the terms of this provision will disqualify any proposal. The City reserves the right to reject any proposal based upon the Contractor's prior history with the City or with any other party, which documents, without limitation, unsatisfactory performance, adversarial or contentious demeanor, significant failure(s) to meet contract milestones or other contractual failures.

13.21 The City will not be liable for Federal, State, or Local excise taxes.

13.22 Execution of **Attachment A** of this RFP shall constitute an agreement to all terms and conditions specified in the RFP, including, without limitation, the **Attachment B** contract form and all terms and conditions therein, except such terms and conditions that the Contractor expressly excludes.

13.23 The City reserves the right to negotiate final contract terms with any Contractor selected. The contract between the parties will consist of the RFP together with any modifications thereto, and the awarded Contractor's proposal, together with any modifications and clarifications thereto that are submitted at the request of the City during the evaluation and negotiation process. In the event of any conflict or contradiction between or among these documents, the documents shall control in the following order of precedence: the final executed contract, the RFP, any modifications and clarifications to the awarded Contractor's proposal, and the awarded Contractor's proposal. Specific exceptions to this general rule may be noted in the final executed contract.

13.24 Contractor understands and acknowledges that the representations above are material and important, and will be relied on by the City in evaluation of the proposal. Any Contractor misrepresentation shall be treated as fraudulent concealment from the City of the true facts relating to the proposal.

13.25 No announcement concerning the award of a contract as a result of this RFP may be made without the prior written approval of the City.

13.26 Proposers are advised that any contract awarded pursuant to this procurement process that exceeds $100,000 shall be subject to the applicable provisions of Long Beach Municipal Code Section 2.73 et seq, the Equal Benefits Ordinance. Proposers shall refer to **Attachment G** for further information regarding the requirements of the ordinance.

All Proposers shall complete and return, with their bid, the Equal Benefits Ordinance Compliance form contained in **Attachment G**. Unless otherwise specified in the procurement package, Proposers do not need to submit with their bid supporting documentation proving compliance. However, supporting documentation verifying that the benefits are provided equally shall be required if the proposer is selected for award of a contract.

13.27 All work performed in connection with the Project shall be performed in compliance with all applicable laws, ordinances, rules and regulations of federal, state, county or municipal governments or agencies (including, without limitation, all applicable federal and state labor and prevailing wage standards, including the prevailing wage provisions of sections 1770 *et seq.* of the California Labor Code), and (b) all directions, rules and regulations of any fire marshal, health officer, building inspector, or other officer of every governmental agency now having or hereafter acquiring jurisdiction.

Awarded Consultant shall indemnify, protect and hold harmless City, its Boards, Commissions, and their officials, employees and agents ("Indemnified Parties"), from and against any and all liability, claims, demands, damage, loss, obligations, causes of action, proceedings, awards, fines, judgments, penalties, costs and expenses, including attorneys' fees, court costs, expert and witness fees, and other costs and fees of litigation, arising or alleged to have arisen, in whole or in part, out of or in connection with (1) Awarded Consultant's breach or failure to comply with any of its obligations contained in this Contract, including any obligations arising from the Awarded Consultant's compliance with or failure to comply with applicable laws, including all applicable federal and state labor requirements including, without limitation, the requirements of California Labor Code section 1770 et seq. or (2) negligent or willful acts, errors, omissions or misrepresentations committed by Awarded Consultant, its officers, employees, agents, subconsultants, or anyone under Awarded Consultant's control, in the performance of work or services under this Contract (collectively "Claims" or individually "Claim").

In addition to Awarded Consultant's duty to indemnify, Awarded Consultant shall have a separate and wholly independent duty to defend Indemnified Parties at Awarded Consultant's expense by legal counsel approved by City, from and against all Claims, and shall continue this defense until the Claims are resolved, whether by settlement, judgment or otherwise. No finding or judgment of negligence, fault, breach, or the like on the part of Awarded Consultant shall be required for the duty to defend to arise. City shall notify Awarded Consultant of any Claim, shall tender the defense of the Claim to Awarded Consultant, and shall assist Awarded Consultant, as may be reasonably requested, in the defense.

If a court of competent jurisdiction determines that a Claim was caused by the sole negligence or willful misconduct of Indemnified Parties, Awarded Consultant's costs of defense and indemnity shall be (1) reimbursed in full if the court determines sole negligence by the Indemnified Parties, or (2) reduced by the percentage of willful misconduct attributed by the court to the Indemnified Parties.

If the Awarded Consultant elects to use subconsultants, Awarded Consultant agrees to require its subconsultants to indemnify Indemnified Parties and to provide insurance coverage to the same extent as Awarded Consultant.

The provisions of this Section shall survive the expiration or termination of any Contract with the City.

Awarded Consultant agrees that all public work (as defined in California Labor Code section 1720) performed in relation to this Project (the "Public Work"), if any, shall comply with the requirements of California Labor Code sections 1770 *et seq.* If there is a difference between the general prevailing wage rates determined by the Director of the Department of Industrial Relations and the applicable minimum wage rates determined by the Secretary of Labor (federal) for similar classifications of work, the

Consultant and its Subconsultant of every tier shall pay their workers not less than the higher wage rate.

In all bid specifications, contracts and subcontracts for any such Public Work, Awarded Consultant shall obtain the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in this locality for each craft, classification or type of worker needed to perform the Public Work, and shall include such rates in the bid specifications, contract or subcontract, and post them at each job site. Such bid specifications, contract or subcontract must contain the following provision: "It shall be mandatory for the Awarded Consultant to pay not less than the said prevailing rate of wages to all workers employed by the Awarded Consultant in the execution of this contract. The Awarded Consultant expressly agrees to comply with the penalty provisions of California Labor Code section 1775 and the payroll record keeping requirements of California Labor Code section 1776." Copies of the prevailing rate of per diem wages are on file at the Labor Compliance Office of City Hall, which shall be made available to any interested party on request.

13.28 **CALIFORNIA WAGE RATE REQUIREMENTS**: Pursuant to Division 2, Part 7, Chapter 1 of the Labor Code of the State of California, the Director of Public Works of the City by and on behalf of the City Council has obtained from the Director of the Department of Industrial Relations of the State of California the general prevailing rate of per diem wages, and the general prevailing rate of holiday and overtime work in the locality in which the public work is to be performed for each craft, classification or type of workers needed to perform the Work. Copies of prevailing rate of per diem wages are on file at Labor Compliance Office of City Hall, and shall be made available upon request. Copies may also be obtained on the California Department of Industrial Relations website http://www.dir.ca.gov/dlsr. This project will be subject the **2020-2 prevailing wage** rate, as determined by the Director of the Department of Industrial Relations for the State of California. The Contractor to whom the Contract is awarded, and its subcontractors is directed to pay not less than the general rate of per diem wages for each craft, classification, or type of worker needed to execute the contract. Contractor is required to post a copy of the determination of the director of the prevailing rate of per diem wages at each job site.

13.29 **DEPARTMENT OF INDUSTRIAL RELATIONS (DIR) COMPLIANCE**: This project is a public work and subject to the following: No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)]. No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5. This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations. Contractors are further cautioned that certified payrolls shall be submitted electronically directly to the Department of Industrial Relations.

13.30 CERTIFIED PAYROLL SUBMISSION TO THE CITY OF LONG BEACH: Pursuant to the provisions of Labor Code Section 1776, Contractor shall keep and shall cause each subcontractor performing any portion of the work under this Contract to keep an accurate payroll record, showing the name, address, social security number, work classification, straight time and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by Contractor or subcontractor in connection with the work. Such payroll records for Contractor and all subcontractors shall be certified and shall be available for inspection at all reasonable hours at the principal office of Contractor pursuant to the provisions of Section 1776 of the Labor Code. Contractor's failure to furnish such records to City or City's authorized Labor Compliance representative in the manner provided herein for notices shall entitle City to withhold the penalty prescribed by law from progress payments due to Contractor.

Each contractor and every lower-tier subcontractor and supplier shall be required to submit certified payrolls and labor compliance documentation electronically at the discretion of and the manner specified by the City of Long Beach. Electronic submittal will be a web-based system, accessed on the World Wide Web by a web browser. Each contractor and subcontractor will be given a Log On identification and password to access the City of Long Beach reporting system. The foregoing is in addition to, and not in lieu of, any other requirements or obligations established and imposed by any department of the City with regard to submission and retention of certified payroll records for Contractor and subcontractors.

APPRENTICESHIP EMPLOYMENT: The Contractor shall comply with Section 1777.5 of the Labor Code concerning the employment of apprentices by the Contractor or any subcontractor under the Contractor and, by submitting a Bid and executing the Contract, the Contractor stipulates that it shall so comply.

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Exhibit A

Sample Project Proposal

Please review the City of Long Beach Telecommunications Infrastructure Specification for the list of approved materials.

1. Furnish and install sixty (60) dual outlets with two (2) CommScope SYSTIMAX Category 6 cabling
2. Furnish and install five (5) dual AP drops with two (2) CommScope SYSTIMAX Category 6A cabling
3. Furnish and install a 25-pair CAT 5E cable to be terminated at DEMARC back board with M1 66 block split-50.
    a. Terminate the other end on a 24-port CAT 5E patch panel, with the last 2 pairs terminated on 24th port in a T1 configuration (Violet/Brown and Violet/Slate)
4. Furnish and install (2) CAT 6A cable to be terminated at DEMARC back board on a surface-mount jack.
    a. Terminate the other end to the 24-port unloaded CAT 6A angled patch panel
5. Furnish and install one (1) new 4-post CPI cabinet with the following:
    a. Cable Management:
        i. CPI 6-inch double sided vertical
    b. Patch Panels:
        i. (3) 48-port angled CAT 6
        ii. (1) 24-port, unloaded, angled CAT 6A
        iii. Provide (60) reduced diameter patch cords
            1. (25) 4'
            2. (25) 5'
            3. (10) 7'
    c. Include (60) 10' CAT6 patch cords for end devices
    d. (1) APC Smart-UPS 1500VA – network cable installed
    e. (1) APC AP7800B PDU
6. Furnish and install ladder rack & supports as designed in the plan
7. Terminate all cable runs back to the MDF/IDF.
8. Furnish and install a 4-post rack
    a. Cables shall be installed in the plenum above the drop ceiling and run to the equipment rack.

9. At the station end, the cables shall be:
    a. Terminated on Gray and Blue inserts (Category 6 or 6A as required)
    b. Installed with white faceplates
        i. SMB for Wireless drops, as per existing conditions.
10. All cables shall be tested and labeled per The City of Long Beach Telecommunications Specification
11. Mount and connect customer-provided Cisco AP at each AP location
12. Provide a BOM with line item parts and prevailing wage labor cost

EXHIBIT A - SAMPLE PROJECT PROPOSAL, FLOOR PLAN 1: CONDUIT

RFP TI 21-008 City-Wide Fiber Optic Indoor Cabling

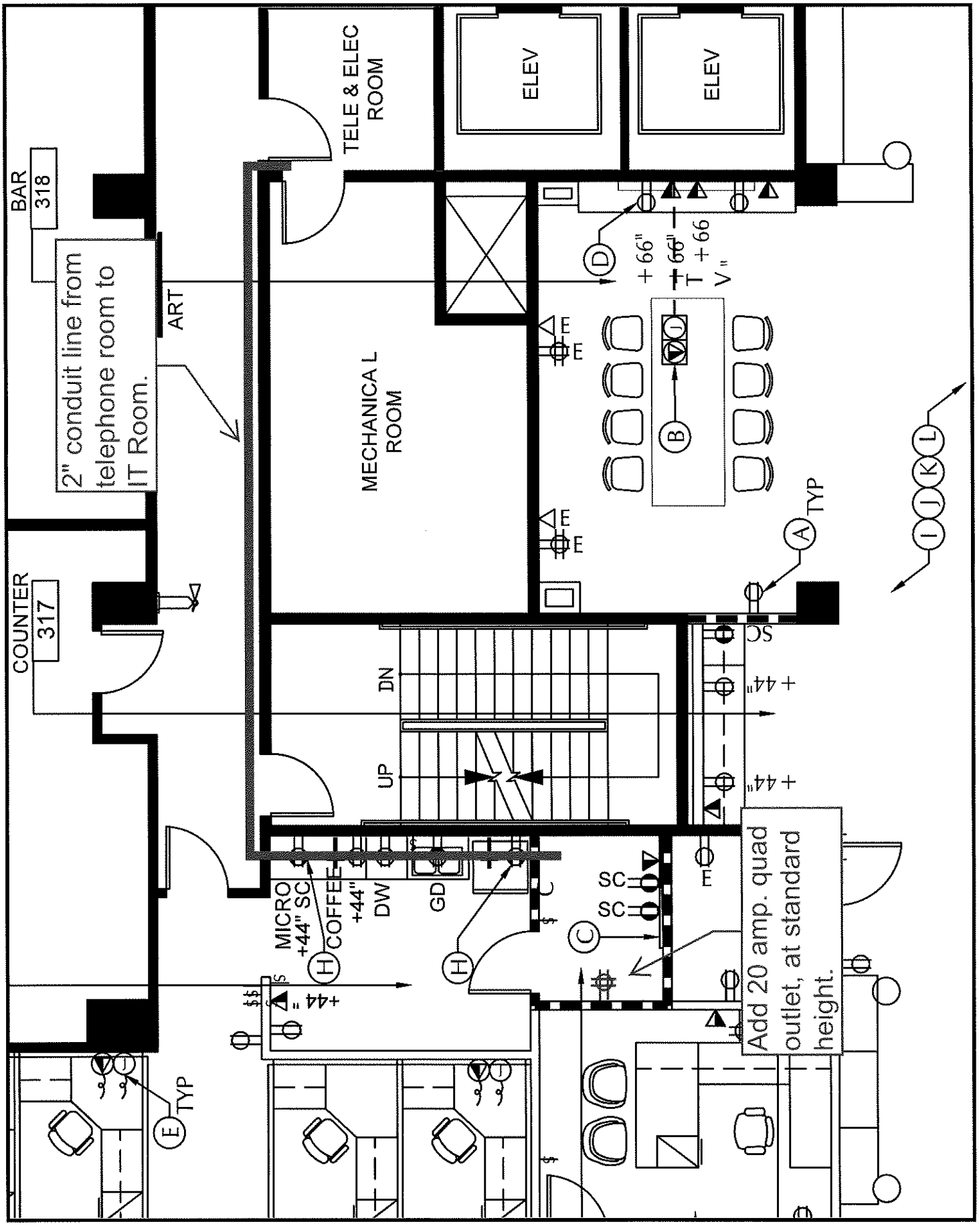
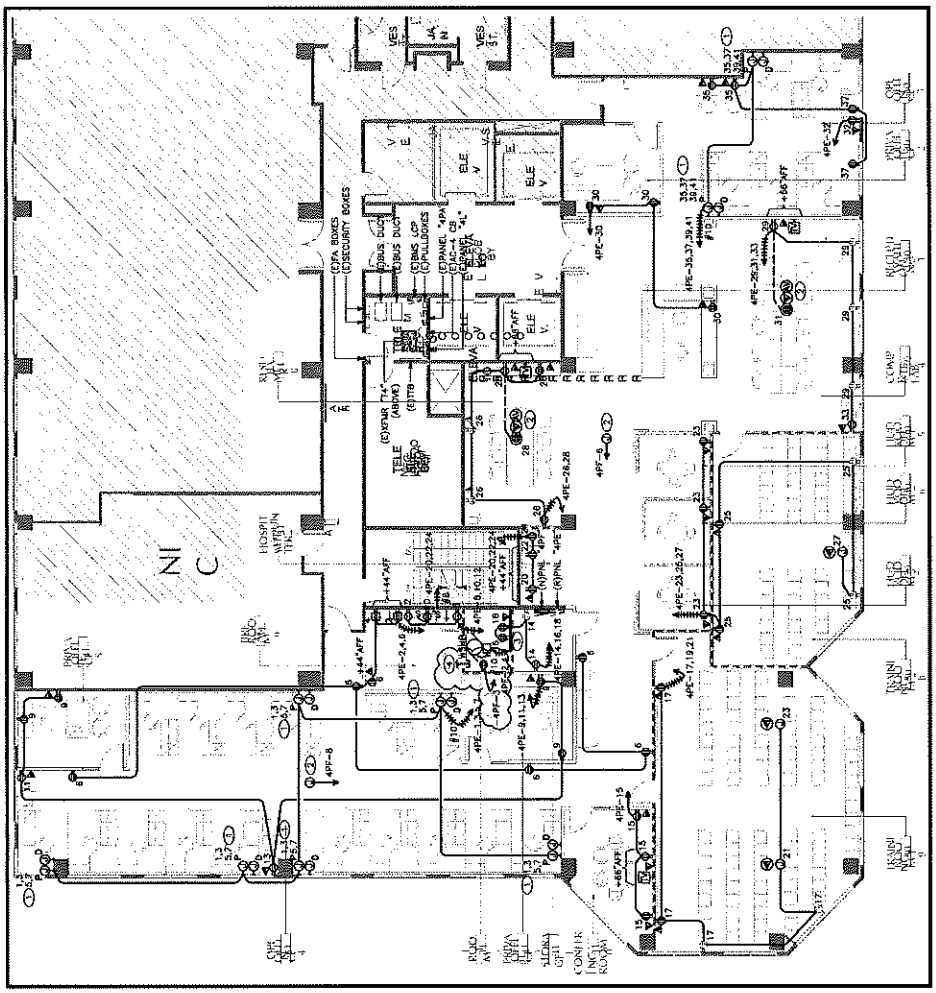


EXHIBIT A - SAMPLE PROJECT PROPOSAL, FLOOR PLAN 2

RFP TI 21-008 City-Wide Fiber Optic Indoor Cabling

PLEASE NOTE: THIS PAGE PRINTS ON 11" x 17" (LEDGER) SIZE PAPER



City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment A

CERTIFICATION OF COMPLIANCE WITH TERMS AND CONDITIONS OF RFP

I have read, understand and agree to comply with the terms and conditions specified in this Request for Proposal. Any exceptions MUST be documented.

SIGNATURE _____

EXCEPTIONS: Attach additional sheets if necessary. Please use this format.

EXCEPTION SUMMARY FORM

RFP SECTION NUMBER	RFP PAGE NUMBER	EXCEPTION (PROVIDE A DETAILED EXPLANATION)
12.6	29	Davis bacon wages are excluded

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment B

PRO-FORMA AGREEMENT

(ATTACHED FOR REFERENCE; TO BE COMPLETED UPON CONTRACT AWARD.)

OFFICE OF THE CITY ATTORNEY
CHARLES PARKIN, City Attorney
411 West Ocean Boulevard, 9th Floor
Long Beach, CA 90802-4664

AGREEMENT

THIS AGREEMENT is made and entered, in duplicate, as of _____, for reference purposes only, pursuant to a minute order adopted by the City Council of the City of Long Beach at its meeting on _____, 20__, by and between (NAME OF CONTRACTOR), a (STATE) corporation/limited liability company etc ("Contractor"), with a place of business at (ADDRESS), and the CITY OF LONG BEACH, a municipal corporation ("City").

WHEREAS, City requires specialized services requiring unique skills to be performed in connection with (SCOPE OF WORK ETC.) ("Project"); and

WHEREAS, City has selected Contractor in accordance with City's administrative procedures using a Request for Proposals ("RFP"), attached hereto as Exhibit "A-1", and incorporated by this reference, and City has determined that Contractor and its employees are qualified, licensed, if so required, and experienced in performing these specialized services; and

WHEREAS, City desires to have Contractor perform these specialized services, and Contractor is willing and able to do so on the terms and conditions in this Agreement;

NOW, THEREFORE, in consideration of the mutual terms, covenants, and conditions in this Agreement, the parties agree as follows:

1. SCOPE OF WORK OR SERVICES.

A. Contractor shall furnish specialized services more particularly described in Exhibit "A-2", attached to this Agreement and incorporated by this reference, in accordance with the standards of the profession, and City shall pay for these services in the manner described below, not to exceed _____ Dollars ($_____), at the rates or charges shown in Exhibit "B".

B. City shall pay Contractor in due course of payments following receipt from Contractor and approval by City of invoices showing the services or

task performed, the time expended (if billing is hourly), and the name of the Project. Contractor shall certify on the invoices that Contractor has performed the services in full conformance with this Agreement and is entitled to receive payment. Each invoice shall be accompanied by a progress report indicating the progress to date of services performed and covered by the invoice, including a brief statement of any Project problems and potential causes of delay in performance, and listing those services that are projected for performance by Contractor during the next invoice cycle. Where billing is done and payment is made on an hourly basis, the parties acknowledge that this arrangement is either customary practice for Contractor's profession, industry or business, or is necessary to satisfy audit and legal requirements which may arise due to the fact that City is a municipality.

C. Contractor represents that Contractor has obtained all necessary information on conditions and circumstances that may affect its performance and has conducted site visits, if necessary.

D. By executing this Agreement, Contractor warrants that Contractor (a) has thoroughly investigated and considered the scope of services to be performed, (b) has carefully considered how the services should be performed, and (c) fully understands the facilities, difficulties and restrictions attending performance of the services under this Agreement. It the services involve work upon any site, Contractor warrants that Contractor has or will investigate the site and is or will be fully acquainted with the conditions there existing, prior to commencement of services set forth in this Agreement. Should Contractor discover any latent or unknown conditions that will materially affect the performance of the services set forth in this Agreement, Contractor must immediately inform the City of that fact and may not proceed except at Contractor's risk until written instructions are received from the City.

E. Contractor must adopt reasonable methods during the life of the Agreement to furnish continuous protection to the work, and the equipment,

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materials, papers, documents, plans, studies and other components to prevent losses or damages, and will be responsible for all damages, to persons or property, until acceptance of the work by the City, except those losses or damages as may be caused by the City's own negligence.

F. CAUTION: Contractor shall not begin work until this Agreement has been signed by both parties and until Contractor's evidence of insurance has been delivered to and approved by City.

2. TERM. The term of this Agreement shall commence at midnight on (BEGINNING DATE), and shall terminate at 11:59 p.m. on (ENDING DATE), unless sooner terminated as provided in this Agreement, or unless the services or the Project is completed sooner.

3. COORDINATION AND ORGANIZATION.

A. Contractor shall coordinate its performance with City's representative, if any, named in Exhibit "C", attached to this Agreement and incorporated by this reference. Contractor shall advise and inform City's representative of the work in progress on the Project in sufficient detail so as to assist City's representative in making presentations and in holding meetings on the Project. City shall furnish to Contractor information or materials, if any, described in Exhibit "D", attached to this Agreement and incorporated by this reference, and shall perform any other tasks described in the Exhibit.

B. The parties acknowledge that a substantial inducement to City for entering this Agreement was and is the reputation and skill of Contractor's key employee, named in Exhibit "E" attached to this Agreement and incorporated by this reference. City shall have the right to approve any person proposed by Contractor to replace that key employee.

4. INDEPENDENT CONTRACTOR. In performing its services, Contractor is and shall act as an independent contractor and not an employee, representative or agent of City. Contractor shall have control of Contractor's work and the

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manner in which it is performed. Contractor shall be free to contract for similar services to be performed for others during this Agreement; provided, however, that Contractor acts in accordance with Section 9 and Section 11 of this Agreement. Contractor acknowledges and agrees that (a) City will not withhold taxes of any kind from Contractor's compensation; (b) City will not secure workers' compensation or pay unemployment insurance to, for or on Contractor's behalf; and (c) City will not provide and Contractor is not entitled to any of the usual and customary rights, benefits or privileges of City employees. Contractor expressly warrants that neither Contractor nor any of Contractor's employees or agents shall represent themselves to be employees or agents of City.

5. INSURANCE.

A. As a condition precedent to the effectiveness of this Agreement, Contractor shall procure and maintain, at Contractor's expense for the duration of this Agreement, from insurance companies that are admitted to write insurance in California and have ratings of or equivalent to A:V by A.M. Best Company or from authorized non-admitted insurance companies subject to Section 1763 of the California Insurance Code and that have ratings of or equivalent to A:VIII by A.M. Best Company, the following insurance:

(a) Commercial general liability insurance (equivalent in scope to ISO form CG 00 01 11 85 or CG 00 01 10 93) in an amount not less than $1,000,000 per each occurrence and $2,000,000 general aggregate. This coverage shall include but not be limited to broad form contractual liability, cross liability, independent contractors liability, and products and completed operations liability. City, its boards and commissions, and their officials, employees and agents shall be named as additional insureds by endorsement (on City's endorsement form or on an endorsement equivalent in scope to ISO form CG 20 10 11 85 or CG 20 26 11 85), and this insurance shall contain no special limitations on the scope of protection given to City, its boards and commissions, and their officials, employees and agents. This

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policy shall be endorsed to state that the insurer waives its right of subrogation against City, its boards and commissions, and their officials, employees and agents.

(b) Workers' Compensation insurance as required by the California Labor Code and employer's liability insurance in an amount not less than $1,000,000. This policy shall be endorsed to state that the insurer waives its right of subrogation against City, its boards and commissions, and their officials, employees and agents.

(c) Professional liability or errors and omissions insurance in an amount not less than $1,000,000 per claim.

(d) Commercial automobile liability insurance (equivalent in scope to ISO form CA 00 01 06 92), covering Auto Symbol 1 (Any Auto) in an amount not less than $500,000 combined single limit per accident.

B. Any self-insurance program, self-insured retention, or deductible must be separately approved in writing by City's Risk Manager or designee and shall protect City, its officials, employees and agents in the same manner and to the same extent as they would have been protected had the policy or policies not contained retention or deductible provisions.

C. Each insurance policy shall be endorsed to state that coverage shall not be reduced, non-renewed or canceled except after thirty (30) days prior written notice to City, shall be primary and not contributing to any other insurance or self-insurance maintained by City, and shall be endorsed to state that coverage maintained by City shall be excess to and shall not contribute to insurance or self-insurance maintained by Contractor. Contractor shall notify City in writing within five (5) days after any insurance has been voided by the insurer or cancelled by the insured.

D. If this coverage is written on a "claims made" basis, it must provide for an extended reporting period of not less than one hundred eighty (180)

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days, commencing on the date this Agreement expires or is terminated, unless Contractor guarantees that Contractor will provide to City evidence of uninterrupted, continuing coverage for a period of not less than three (3) years, commencing on the date this Agreement expires or is terminated.

E. Contractor shall require that all sub-contractors or contractors that Contractor uses in the performance of these services maintain insurance in compliance with this Section unless otherwise agreed in writing by City's Risk Manager or designee.

F. Prior to the start of performance, Contractor shall deliver to City certificates of insurance and the endorsements for approval as to sufficiency and form. In addition, Contractor shall, within thirty (30) days prior to expiration of the insurance, furnish to City certificates of insurance and endorsements evidencing renewal of the insurance. City reserves the right to require complete certified copies of all policies of Contractor and Contractor's sub-Contractors and contractors, at any time. Contractor shall make available to City's Risk Manager or designee all books, records and other information relating to this insurance, during normal business hours.

G. Any modification or waiver of these insurance requirements shall only be made with the approval of City's Risk Manager or designee. Not more frequently than once a year, City's Risk Manager or designee may require that Contractor, Contractor's sub-Contractors and contractors change the amount, scope or types of coverages required in this Section if, in his or her sole opinion, the amount, scope or types of coverages are not adequate.

H. The procuring or existence of insurance shall not be construed or deemed as a limitation on liability relating to Contractor's performance or as full performance of or compliance with the indemnification provisions of this Agreement.

6. ASSIGNMENT AND SUBCONTRACTING. This Agreement contemplates the personal services of Contractor and Contractor's employees, and the

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parties acknowledge that a substantial inducement to City for entering this Agreement was and is the professional reputation and competence of Contractor and Contractor's employees. Contractor shall not assign its rights or delegate its duties under this Agreement, or any interest in this Agreement, or any portion of it, without the prior approval of City, except that Contractor may with the prior approval of the City Manager of City, assign any moneys due or to become due Contractor under this Agreement. Any attempted assignment or delegation shall be void, and any assignee or delegate shall acquire no right or interest by reason of an attempted assignment or delegation. Furthermore, Contractor shall not subcontract any portion of its performance without the prior approval of the City Manager or designee, or substitute an approved sub-Contractor or contractor without approval prior to the substitution. Nothing stated in this Section shall prevent Contractor from employing as many employees as Contractor deems necessary for performance of this Agreement.

7. CONFLICT OF INTEREST. Contractor, by executing this Agreement, certifies that, at the time Contractor executes this Agreement and for its duration, Contractor does not and will not perform services for any other client which would create a conflict, whether monetary or otherwise, as between the interests of City and the interests of that other client. And, Contractor shall obtain similar certifications from Contractor's employees, sub-Contractors and contractors.

8. MATERIALS. Contractor shall furnish all labor and supervision, supplies, materials, tools, machinery, equipment, appliances, transportation and services necessary to or used in the performance of Contractor's obligations under this Agreement, except as stated in Exhibit "D".

9. OWNERSHIP OF DATA. All materials, information and data prepared, developed or assembled by Contractor or furnished to Contractor in connection with this Agreement, including but not limited to documents, estimates, calculations, studies, maps, graphs, charts, computer disks, computer source documentation, samples, models, reports, summaries, drawings, designs, notes, plans, information, material and

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memorandum ("Data") shall be the exclusive property of City. Data shall be given to City, and City shall have the unrestricted right to use and disclose the Data in any manner and for any purpose without payment of further compensation to Contractor. Copies of Data may be retained by Contractor but Contractor warrants that Data shall not be made available to any person or entity for use without the prior approval of City. This warranty shall survive termination of this Agreement for five (5) years.

10. TERMINATION. Either party shall have the right to terminate this Agreement for any reason or no reason at any time by giving fifteen (15) calendar days prior notice to the other party. In the event of termination under this Section, City shall pay Contractor for services satisfactorily performed and costs incurred up to the effective date of termination for which Contractor has not been previously paid. The procedures for payment in Section 1.B. with regard to invoices shall apply. On the effective date of termination, Contractor shall deliver to City all Data developed or accumulated in the performance of this Agreement, whether in draft or final form, or in process. And, Contractor acknowledges and agrees that City's obligation to make final payment is conditioned on Contractor's delivery of the Data to City.

11. CONFIDENTIALITY. Contractor shall keep all Data confidential and shall not disclose the Data or use the Data directly or indirectly, other than in the course of performing its services, during the term of this Agreement and for five (5) years following expiration or termination of this Agreement. In addition, Contractor shall keep confidential all information, whether written, oral or visual, obtained by any means whatsoever in the course of performing its services for the same period of time. Contractor shall not disclose any or all of the Data to any third party, or use it for Contractor's own benefit or the benefit of others except for the purpose of this Agreement.

12. BREACH OF CONFIDENTIALITY. Contractor shall not be liable for a breach of confidentiality with respect to Data that: (a) Contractor demonstrates Contractor knew prior to the time City disclosed it; or (b) is or becomes publicly available without breach of this Agreement by Contractor; or (c) a third party who has a right to disclose does

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so to Contractor without restrictions on further disclosure; or (d) must be disclosed pursuant to subpoena or court order.

13. ADDITIONAL SERVICES. The City has the right at any time during the performance of the services, without invalidating this Agreement, to order extra work beyond that specified in the RFP or make changes by altering, adding to or deducting from the work. No extra work may be undertaken unless a written order is first given by the City, incorporating any adjustment in the Agreement Sum, or the time to perform this Agreement. Any increase in compensation of ten percent (10%) or less of the Agreement Sum, or in the time to perform of One Hundred Eighty (180) days or less, may be approved by the City Representative. Any greater increases, taken either separately or cumulatively, must be approved by the City Council. It is expressly understood by Contractor that the provisions of this paragraph do not apply to services specifically set forth in the RFP or reasonably contemplated in the RFP. Contractor acknowledges that it accepts the risk that the services to be provided pursuant to the RFP may be more costly or time consuming than Contractor anticipates and that Contractor will not be entitled to additional compensation for the services set forth in the RFP.

14. RETENTION OF FUNDS. Contractor authorizes the City to deduct from any amount payable to Contractor (whether or not arising out of this Agreement) any amounts the payment of which may be in dispute or that are necessary to compensate the City for any losses, costs, liabilities or damages suffered by the City, and all amounts for which the City may be liable to third parties, by reason of Contractor's acts or omissions in performing or failing to perform Contractor's obligations under this Agreement. In the event that any claim is made by a third party, the amount or validity of which is disputed by Contractor, or any indebtedness exists that appears to be the basis for a claim of lien, the City may withhold from any payment due, without liability for interest because of the withholding, an amount sufficient to cover the claim. The failure of the City to exercise the right to deduct or to withhold will not, however, affect the obligations of Contractor to insure, indemnify and protect the City as elsewhere provided in this Agreement.

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15. AMENDMENT. This Agreement, including all Exhibits, shall not be amended, nor any provision or breach waived, except in writing signed by the parties which expressly refers to this Agreement.

16. LAW. This Agreement shall be construed in accordance with the laws of the State of California, and the venue for any legal actions brought by any party with respect to this Agreement shall be the County of Los Angeles, State of California for state actions and the Central District of California for any federal actions. Contractor shall cause all work performed in connection with construction of the Project to be performed in compliance with (1) all applicable laws, ordinances, rules and regulations of federal, state, county or municipal governments or agencies (including, without limitation, all applicable federal and state labor standards, including the prevailing wage provisions of sections 1770 *et seq.* of the California Labor Code); and (2) all directions, rules and regulations of any fire marshal, health officer, building inspector, or other officer of every governmental agency now having or hereafter acquiring jurisdiction. If any part of this Agreement is found to be in conflict with applicable laws, that part will be inoperative, null and void insofar as it is in conflict with any applicable laws, but the remainder of the Agreement will remain in full force and effect.

17. PREVAILING WAGES.

A. Consultant agrees that all public work (as defined in California Labor Code section 1720) performed pursuant to this Agreement (the "Public Work"), if any, shall comply with the requirements of California Labor Code sections 1770 *et seq.* City makes no representation or statement that the Project, or any portion thereof, is or is not a "public work" as defined in California Labor Code section 1720.

B. In all bid specifications, contracts and subcontracts for any such Public Work, Consultant shall obtain the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work in this locality for each craft, classification or type of worker needed to perform the Public Work,

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and shall include such rates in the bid specifications, contract or subcontract. Such bid specifications, contract or subcontract must contain the following provision: "It shall be mandatory for the contractor to pay not less than the said prevailing rate of wages to all workers employed by the contractor in the execution of this contract. The contractor expressly agrees to comply with the penalty provisions of California Labor Code section 1775 and the payroll record keeping requirements of California Labor Code section 1771."

18. ENTIRE AGREEMENT. This Agreement, including all Exhibits, constitutes the entire understanding between the parties and supersedes all other agreements, oral or written, with respect to the subject matter in this Agreement.

19. INDEMNITY.

A. Consultant shall indemnify, protect and hold harmless City, its Boards, Commissions, and their officials, employees and agents ("Indemnified Parties"), from and against any and all liability, claims, demands, damage, loss, obligations, causes of action, proceedings, awards, fines, judgments, penalties, costs and expenses, including attorneys' fees, court costs, expert and witness fees, and other costs and fees of litigation, arising or alleged to have arisen, in whole or in part, out of or in connection with (1) Consultant's breach or failure to comply with any of its obligations contained in this Agreement, including all applicable federal and state labor requirements including, without limitation, the requirements of California Labor Code section 1770 *et seq.* or (2) negligent or willful acts, errors, omissions or misrepresentations committed by Consultant, its officers, employees, agents, subcontractors, or anyone under Consultant's control, in the performance of work or services under this Agreement (collectively "Claims" or individually "Claim").

B. In addition to Consultant's duty to indemnify, Consultant shall have a separate and wholly independent duty to defend Indemnified Parties at Consultant's expense by legal counsel approved by City, from and against all

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Claims, and shall continue this defense until the Claims are resolved, whether by settlement, judgment or otherwise. No finding or judgment of negligence, fault, breach, or the like on the part of Consultant shall be required for the duty to defend to arise. City shall notify Consultant of any Claim, shall tender the defense of the Claim to Consultant, and shall assist Consultant, as may be reasonably requested, in the defense.

C. If a court of competent jurisdiction determines that a Claim was caused by the sole negligence or willful misconduct of Indemnified Parties, Consultant's costs of defense and indemnity shall be (1) reimbursed in full if the court determines sole negligence by the Indemnified Parties, or (2) reduced by the percentage of willful misconduct attributed by the court to the Indemnified Parties.

D. The provisions of this Section shall survive the expiration or termination of this Agreement.

20. FORCE MAJEURE. If any party fails to perform its obligations because of strikes, lockouts, labor disputes, embargoes, acts of God, inability to obtain labor or materials or reasonable substitutes for labor materials, governmental restrictions, governmental regulations, governmental controls, judicial orders, enemy or hostile governmental action, civil commotion, fire or other casualty, or other causes beyond the reasonable control of the party obligated to perform, then that party's performance will be excused for a period equal to the period of such cause for failure to perform.

21. AMBIGUITY. In the event of any conflict or ambiguity between this Agreement and any Exhibit, the provisions of this Agreement shall govern.

22. NONDISCRIMINATION.

A. In connection with performance of this Agreement and subject to applicable rules and regulations, Contractor shall not discriminate against any employee or applicant for employment because of race, religion, national origin, color, age, sex, sexual orientation, gender identity, AIDS, HIV status, handicap or disability. Contractor shall ensure that applicants are employed, and that employees

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are treated during their employment, without regard to these bases. These actions shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

23. EQUAL BENEFITS ORDINANCE. Unless otherwise exempted in accordance with the provisions of the Ordinance, this Agreement is subject to the applicable provisions of the Equal Benefits Ordinance (EBO), section 2.73 et seq. of the Long Beach Municipal Code, as amended from time to time.

A. During the performance of this Agreement, the Consultant certifies and represents that the Consultant will comply with the EBO. The Consultant agrees to post the following statement in conspicuous places at its place of business available to employees and applicants for employment:

"During the performance of a contract with the City of Long Beach, the Consultant will provide equal benefits to employees with spouses and its employees with domestic partners. Additional information about the City of Long Beach's Equal Benefits Ordinance may be obtained from the City of Long Beach Business Services Division at 562-570-6200."

B. The failure of the Consultant to comply with the EBO will be deemed to be a material breach of the Agreement by the City.

C. If the Consultant fails to comply with the EBO, the City may cancel, terminate or suspend the Agreement, in whole or in part, and monies due or to become due under the Agreement may be retained by the City. The City may also pursue any and all other remedies at law or in equity for any breach.

D. Failure to comply with the EBO may be used as evidence against the Consultant in actions taken pursuant to the provisions of Long Beach Municipal Code 2.93 et seq., Contractor Responsibility.

E. If the City determines that the Consultant has set up or used its contracting entity for the purpose of evading the intent of the EBO, the City may

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terminate the Agreement on behalf of the City. Violation of this provision may be used as evidence against the Consultant in actions taken pursuant to the provisions of Long Beach Municipal Code Section 2.93 et seq., Contractor Responsibility.

24. NOTICES. Any notice or approval required by this Agreement shall be in writing and personally delivered or deposited in the U.S. Postal Service, first class, postage prepaid, addressed to Contractor at the address first stated above, and to City at 411 West Ocean Boulevard, Long Beach, California 90802, Attn: City Manager, with a copy to the City Clerk at the same address. Notice of change of address shall be given in the same manner as stated for other notices. Notice shall be deemed given on the date deposited in the mail or on the date personal delivery is made, whichever occurs first.

25. COVENANT AGAINST CONTINGENT FEES. Contractor warrants that Contractor has not employed or retained any entity or person to solicit or obtain this Agreement and that Contractor has not paid or agreed to pay any entity or person any fee, commission or other monies based on or from the award of this Agreement. If Contractor breaches this warranty, City shall have the right to terminate this Agreement immediately notwithstanding the provisions of Section 10 or, in its discretion, to deduct from payments due under this Agreement or otherwise recover the full amount of the fee, commission or other monies.

26. WAIVER. The acceptance of any services or the payment of any money by City shall not operate as a waiver of any provision of this Agreement or of any right to damages or indemnity stated in this Agreement. The waiver of any breach of this Agreement shall not constitute a waiver of any other or subsequent breach of this Agreement.

27. CONTINUATION. Termination or expiration of this Agreement shall not affect rights or liabilities of the parties which accrued pursuant to Sections 7, 10, 11, 18, 21 and 28 prior to termination or expiration of this Agreement.

28. TAX REPORTING. As required by federal and state law, City is obligated to and will report the payment of compensation to Contractor on Form 1099-Misc.

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Contractor shall be solely responsible for payment of all federal and state taxes resulting from payments under this Agreement. Contractor shall submit Contractor's Employer Identification Number (EIN), or Contractor's Social Security Number if Contractor does not have an EIN, in writing to City's Accounts Payable, Department of Financial Management. Contractor acknowledges and agrees that City has no obligation to pay Contractor until Contractor provides one of these numbers.

29. ADVERTISING. Contractor shall not use the name of City, its officials or employees in any advertising or solicitation for business or as a reference, without the prior approval of the City Manager or designee.

30. AUDIT. City shall have the right at all reasonable times during the term of this Agreement and for a period of five (5) years after termination or expiration of this Agreement to examine, audit, inspect, review, extract information from and copy all books, records, accounts and other documents of Contractor relating to this Agreement.

31. THIRD PARTY BENEFICIARY. This Agreement is not intended or designed to or entered for the purpose of creating any benefit or right for any person or entity of any kind that is not a party to this Agreement.

IN WITNESS WHEREOF, the parties have caused this document to be duly executed with all formalities required by law as of the date first stated above.

(NAME OF CONTRACTOR)

_____, 20__ By_____
Name_____
Title_____

_____, 20__ By_____
Name_____
Title_____

"Contractor"

CITY OF LONG BEACH, a municipal corporation

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_____, 20__ By_____
City Manager

"City"

This Agreement is approved as to form on _____, 20__.

CHARLES PARKIN, City Attorney

By _____
Deputy

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City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment C

Statement of Non-collusion

The proposal is submitted as a firm and fixed request valid and open for 90 days from the submission deadline.

This proposal is genuine, and not sham or collusive, nor made in the interest or in behalf of any person not herein named; the Proposer has not directly or indirectly induced or solicited any other Proposer to put in a sham proposal and the Proposer has not in any manner sought by collusion to secure for himself or herself an advantage over any other Proposer.

In addition, this organization and its members are not now and will not in the future be engaged in any activity resulting in a conflict of interest, real or apparent, in the selection, award, or administration of a subcontract.

Authorized signature and date

Edward Fusco President

Print Name & Title

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment D

Debarment, Suspension, Ineligibility and Voluntary Exclusion Certification

Please read Acceptance of Certification and Instructions for Certification before completing

As a current or potential vendor for the City of Long Beach (City) your firm, through its business relationship with the City, may be the recipient of federal grant funds. As such, the City is required to document that neither your business entity or organization, nor any of your principals are debarred, suspended, ineligible, or have voluntarily been excluded from receiving federal grant funds. Consistent with Executive Order No. 12549 Title 2 CFR Part 180 Subpart C, all potential recipients of federal grant funds are required to comply with the requirements specified below. By submission of proposal/bid/agreement, the undersigned, under penalty of perjury, certifies that the participant, nor any of its principals in the capacity of owner, director, partner, officer, manager, or other person with substantial influence in the development or outcome of a covered transaction, whether or not employed by the participant:

- Are not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal department or agency;
- Have not, within a three (3) year period preceding this bid/agreement/proposal, been suspended, debarred, voluntarily excluded or declared ineligible by a federal agency;
- Do not presently have a proposed debarment proceeding pending;
- Have not, within a three (3) year period preceding this bid/agreement/proposal, been indicted or convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct;
- Have not, within a three (3) year period preceding this bid/agreement/proposal, had one or more public transactions (Federal, State, or local) terminated for cause or default.

If reorganization, management turnover, or a shift or change of principals' status occurs, written notice must be submitted within 21 days. Subsequent disclosure of unfavorable information will be subject to thorough review and remedial action. Updated versions of this certification may be requested on a routine basis.

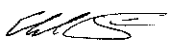
Where the potential prospective recipient of Federal assistance funds is unable to certify to any of the statement in this certification, such prospective participant shall attach an explanation to the applicable bid/agreement/proposal.

Intelinet Incorporated

Business/Contractor/Agency

Edward Fusco President

Name of Authorized Representative | Title of Authorized Representative



12/23/20

Signature of Authorized Representative | Date

r20141001

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Acceptance of Certification

1. This bid/agreement/proposal or like document has the potential to be a recipient of Federal funds. In order to be in compliance with Code of Federal Regulations, the City requires this completed form. By signing and submitting this document, the prospective bidder/proposer is providing the certification and acknowledgement as follows:
2. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549.
3. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective recipient of Federal assistance funds knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
4. The potential recipient of Federal assistance funds agrees by submitting this bid/agreement/proposal or like document that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

Instructions for completing the form, *Attachment – Debarment Certification*

1. The City of Long Beach sometimes receives Federal funding on certain purchases/projects. To ensure that the City is in compliance with Federal regulations we require this form to be completed.
2. The City of Long Beach checks the System for Award Management at *www.sam.gov* to make sure that Contractors who are awarded City contracts and/or purchase orders are not debarred or suspended. Prospective contractors should perform a search on this website for your company and or persons associated with your business.
3. If your business is in compliance with the conditions in the form, please have the appropriate person complete and sign this form and return with your bid/proposal/agreement.
4. If at any time, your business or persons associated with your business become debarred or suspended, we require that you inform us of this change in status.
5. If there are any exceptions to the certification, please include an attachment. Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception, indicate to whom it applies, initiating agency and dates of action.
6. Note: Providing false information may result in criminal prosecution or administrative sanctions.

If you have any questions on how to complete this form, please contact the Purchasing Division in the City of Long Beach Business Services Bureau at 562-570-6200.

Rev 12.11.13

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment E

W-9 Request for Taxpayer Identification Number and Certification

[W-9 Form must be signed and dated.]

[Form-Fillable PDF available at http://www.irs.gov/pub/irs-pdf/fw9.pdf]

[Vendor Application Form is for internal City use only.]

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Form **W-9**
(Rev. December 2014)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank.

2 Business name/disregarded entity name, if different from above

3 Check appropriate box for federal tax classification; check only **one** of the following seven boxes:
☐ Individual/sole proprietor or single-member LLC ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate
☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____
Note. For a single-member LLC that is disregarded, do not check LLC; check the appropriate box in the line above for the tax classification of the single-member owner.
☐ Other (see instructions) ▶

4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):
Exempt payee code (if any) _____
Exemption from FATCA reporting code (if any) _____
(Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the instructions for line 1 and the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

or

Employer identification number
☐☐ – ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here | **Signature of U.S. person** ▶ | **Date** ▶

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. Information about developments affecting Form W-9 (such as legislation enacted after we release it) is at *www.irs.gov/fw9*.

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following:

- Form 1099-INT (interest earned or paid)
- Form 1099-DIV (dividends, including those from stocks or mutual funds)
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds)
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers)
- Form 1099-S (proceeds from real estate transactions)
- Form 1099-K (merchant card and third party network transactions)
- Form 1098 (home mortgage interest), 1098-E (student loan interest), 1098-T (tuition)
- Form 1099-C (canceled debt)
- Form 1099-A (acquisition or abandonment of secured property)

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

If you do not return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding?* on page 2.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct. See *What is FATCA reporting?* on page 2 for further information.

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
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VENDOR APPLICATION FORM

Company Name (same as line 1 on W9):	
DBA Name (same as line 2 on W9):	
Federal Tax ID Number (or SSN):	leave blank if not applicable required (this number is a fed tax ID: ○ SSN: ○
Web Address:	
Purchase Order Address:	
Attn:	
City:	
State:	Zip Code:
Contact Name:	
Email:	
Phone Number:	
Fax:	
Toll Free:	
	If 'remit to' address is the same as the purchase order address, put SAME in first box only
'Remit to' Address :	
Attn:	
City:	
State:	Zip Code:
Contact Name:	
Email:	
Phone Number:	
Fax:	
Toll Free:	

Type of Ownership:
Individual ○ Partnership ○ Corporation ○ LLC ○ Nonprofit ○ Government ○

Composition of Ownership (at least 51% of ownership of the organization) (check all that apply)
MBE ○ WBE ○ Local ○ DBE ○ Certified SBE ○ Certified Micro ○
State certification number:

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment F

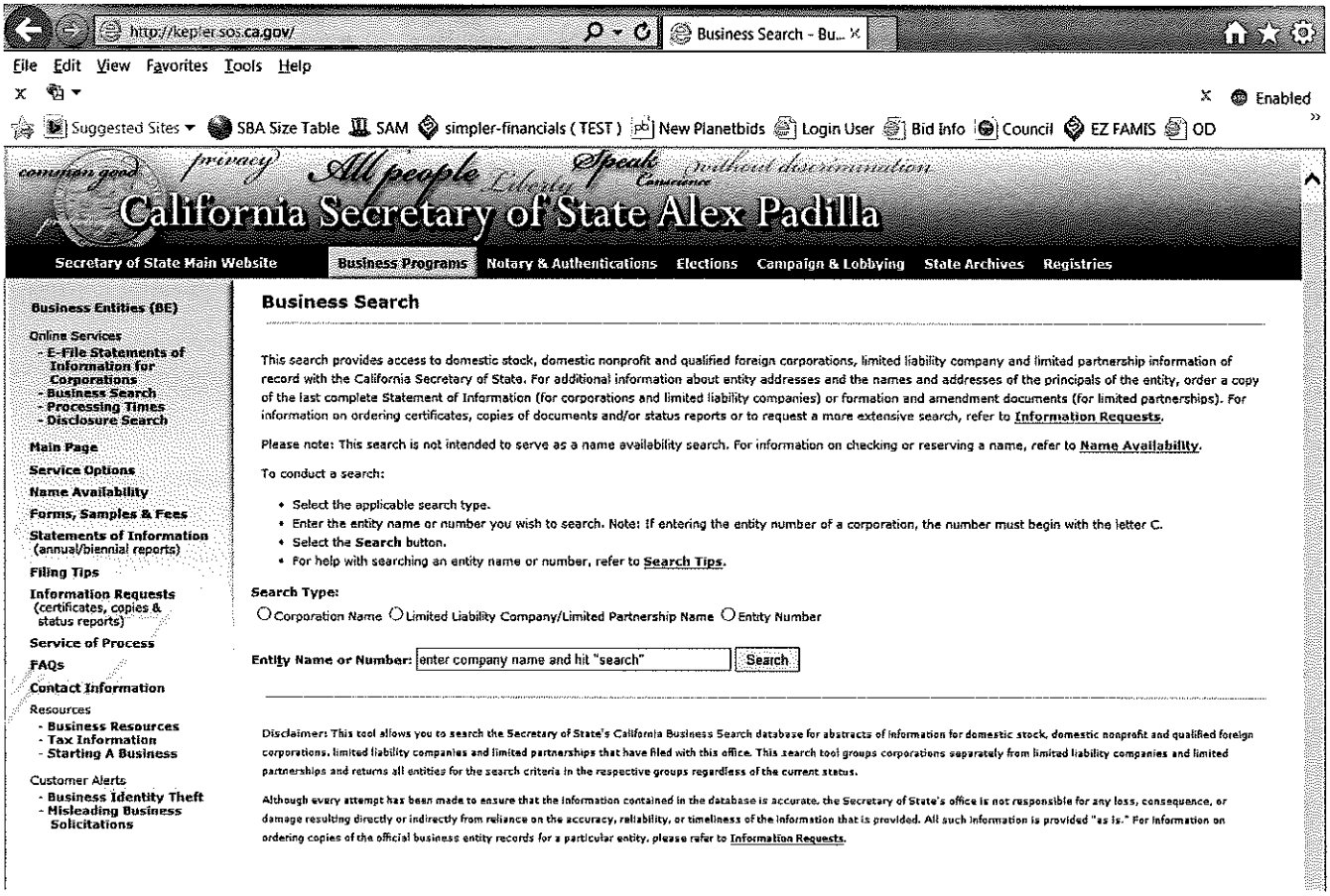
Secretary of State Certification

Please provide print out showing your business is registered with the California Secretary of State.

(Note, individual and sole proprietor companies are not required to register)

Awarded vendors/contractors must be registered with the California Secretary of State prior to contract execution. For more information, please consult:

www.kepler.sos.ca.gov/



Attachment G

EQUAL BENEFITS ORDINANCE (EBO) DISCLOSURE FORM

As a condition of being awarded a contract with the City of Long Beach ("City"), the selected Contractor/Vendor ("Contractor") may be required during the performance of the Contract, to comply with the City's nondiscrimination provisions of the Equal Benefits Ordinance ("EBO") set forth in the Long Beach Municipal Code section 2.73 et seq. The EBO requires that during the performance o f the contract, the Contractor shall provide equal benefits to its employees with spouses and employees with domestic partners. Benefits include but are not limited to, health benefits, bereavement leave, family medical leave, member ship and membership discounts, moving expenses, retirement benefits and travel benefits. A cash equivalent payment is permitted if an employer has made all reasonable efforts to provide domestic partners with access to benefits but is unable to do so. A situation in which a cash equivalent payment might be used if where the employer has difficulty finding an insurance provider that is willing to provide domestic partner benefits.

The EBO is applicable to the following employers:

- For-profit employers that have a contract with the City for the purchase of goods, services, public works or improvements and other construction projects in the amount of $100,000 or more

- For-profit entities that generate $350,000 or more in annual gross receipts leasing City property pursuant to a written agreement for a term exceeding 29 days in any calendar year

Contractors who are subject to the EBO must certify to the City before execution of the contract that they are in compliance with the EBO by completing the EBO Certification Form, attached, or that they have been issued a waiver by the City. Contractors must also allow authorized City representatives access to records so the City can verify compliance with the EBO.

The EBO includes provisions that address difficulties associated with implementing procedures to comply with the EBO. Contractors can delay implementation of procedures to comply with the EBO in the following circumstances

1) By the first effective date after the first open enrollment process following the contract start date, not to exceed two years, if the Contractor/vendor submits evidence of taking reasonable measures to comply with the EBO; or

2) At such time that the administrative steps can be taken to incorporate nondiscrimination in benefits in the Contractor/vendor's infrastructure, not to exceed three months; or

3) Upon expiration of the contractor's current collective bargaining agreement(s).

Compliance with the EBO

If a contractor has not received a waiver from complying with the EBO and the timeframe within which it can delay implementation has expired but it has failed to comply with the EBO, the

Contractor may be deemed to be in material breach of the Contract. In the event of a material breach, the City may cancel, terminate or suspend the City agreement, in whole or in part. The City also may deem the Contractor an irresponsible bidder and disqualify the Contractor from contracting with the City for a period of three years. In addition, the City may assess liquidated damages against the Contractor which may be deducted from money otherwise due the Contractor. The City may also pursue any other remedies available at law or in equity.

By my signature below, I acknowledge that the Contractor understands that to the extent it is subject to the provisions of the Long Beach Municipal Code section 2.73, the Contractor shall comply with this provision.

Printed Name: Edward Fusco Title: President

Signature: _____ Date: 12/23/20

Business Entity Name: Intelinet Incorporated

CERTIFICATION OF COMPLIANCE WITH THE EQUAL BENEFITS ORDINANCE

Section 1. CONTRACTOR/VENDOR INFORMATION

Name: Intelinet Incorporated Federal Tax ID No [redacted]
Address: 9106 Pulsar Ct
City: Corona State: Ca ZIP: 92883
Contact Person: Edward Fusco Telephone: 951 277 7669
Email: efusco@Intelnt.com Fax: _____

Section 2. COMPLIANCE QUESTIONS

A. The EBO is inapplicable to this Contract because the Contractor/Vendor has no employees. _____Yes _x_No

B. Does your company provide (or make available at the employees' expense) any employee benefits? X Yes _____No
(If "yes," proceed to Question C. If "no," proceed to section 5, as the EBO does not apply to you.)

C. Does your company provide (or make available at the employees' expense) any benefits to the spouse of an employee?
X Yes _____No

D. Does your company provide (or make available at the employees' expense) any benefits to the domestic partner of an employee?
X Yes _____No (If you answered "no" to both questions C and D, proceed to section 5, as the EBO is not applicable to this contract. If you answered "yes" to both Questions C and D, please continue to Question E. If you answered "yes" to Question C and "no" to Question D, please continue to section 3.)

E. Are the benefits that are available to the spouse of an employee identical to the benefits that are available to the domestic partner of an employee? X Yes
____No
(If "yes," proceed to section 4, as you are in compliance with the EBO. If "no," continue to section 3.)

Section 3. PROVISIONAL COMPLIANCE

A. Contractor/vendor is not in compliance with the EBO now but will comply by the following date:

_____ By the first effective date after the first open enrollment process following the contract start date, not to exceed two years, if the Contractor/vendor submits evidence of taking reasonable measures to comply with the EBO; or

_____ At such time that the administrative steps can be taken to incorporate nondiscrimination in benefits in the Contractor/vendor's infrastructure, not to exceed three months; or

_____ Upon expiration of the contractor's current collective bargaining agreement(s).

B. If you have taken all reasonable measures to comply with the EBO but are unable to do so, do you agree to provide employees with a cash equivalent? (The cash equivalent is the amount of money your company pays for spousal benefits that are unavailable for domestic partners.)
____Yes ____ No

Section 4. REQUIRED DOCUMENTATION

At time of issuance of purchase order or contract award, you may be required by the City to provide documentation (copy of employee handbook, eligibility statement from your plans, insurance provider statement, etc.) to verify that you do not discriminate in the provision of benefits.

Section 5. CERTIFICATION

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct and that I am authorized to bind this entity contractually. By signing this certification, I further agree to comply with all additional obligations of the Equal Benefits Ordinance that are set forth in the Long Beach Municipal Code and in the terms of the contract of purchase order with the City.

Executed this 23 day of December, 2020, at Riverside County, CA

Name Edward Fusco Signature _____

Title President Federal Tax ID No. 20-1184437

ORDINANCE NO. ORD-09-0036

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF LONG BEACH AMENDING THE LONG BEACH MUNICIPAL CODE BY ADDING CHAPTER 2.73 ESTABLISHING AN "EQUAL BENEFITS ORDINANCE" REQUIRING CONTRACTORS ON CITY CONTRACTS TO PROVIDE EMPLOYEE BENEFITS TO THEIR EMPLOYEES WITH DOMESTIC PARTNERS EQUIVALENT TO THOSE PROVIDED TO THEIR EMPLOYEES WITH SPOUSES

WHEREAS, employee benefits comprise a significant portion of total employee compensation; and

WHEREAS, discrimination in the provision of employee benefits between employees with domestic partners and employees with spouses results in unequal pay for equal work; and

WHEREAS, the City of Long Beach prohibits discrimination based on marital status and/or sexual orientation; and

WHEREAS, contractors with the City of Long Beach are required to comply with the City's nondiscrimination laws; and

WHEREAS, the City Council finds and determines that the public, health, safety and welfare will be furthered by requiring that public funds be expended in such a manner as to prohibit discrimination in the provision of employee benefits by City contractors between employees with spouses and employees with domestic partners, and between domestic partners and spouses of such employees;

NOW, THEREFORE, the City Council of the City of Long Beach ordains as follows:

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OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

Section 1. Chapter 2.73 is added to the Long Beach Municipal Code to read as follows:

Chapter 2.73

EQUAL BENEFITS TO EMPLOYEES OF CITY CONTRACTORS

2.73.010 Title and purpose.

This ordinance shall be known as the "Long Beach Equal Benefits Ordinance". The purpose of this Chapter is to protect the public health, safety and welfare by requiring that public funds be expended in such a manner as to prohibit discrimination in the provision of employee benefits by City contractors between employees with spouses and employees with domestic partners, and/or between domestic partners and spouses of such employees.

2.73.020 Definitions.

A. "Contractor" shall mean any person or persons, firm, partnership, corporation, or combination thereof, who enters into a contract with the City.

B. "Domestic partner" shall mean any person who has a currently registered domestic partnership with a governmental body pursuant to state or local law authorizing such registration or with his or her employer or his or her domestic partner's employer.

C. "Non-profit" shall mean a non-profit organization described in Section 501(c)(3) of the Internal Revenue Code of 1954 which is exempt from taxation under Section 501(c)(3) of that Code, or any nonprofit educational organization qualified under Section 23701(d) of the Revenue and Taxation Code.

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2.73.030 Contractors subject to requirements.

A. The following contractors are subject to this Chapter:

1. For-profit entities which enter into an agreement with the City for public works or improvements to be performed, or for goods or services to be purchased, for an amount of One Hundred Thousand Dollars ($100,000) or more; and

2. For-profit entities which generate Three Hundred Fifty Thousand Dollars ($350,000) or more in annual gross receipts and which occupy City property pursuant to a written agreement for the exclusive use or occupancy of said property for a term exceeding twenty-nine (29) days in any calendar year.

B. The requirements of this Chapter shall only apply to those portions of a contractor's operations that occur (i) within the City; (ii) on real property outside the City if the property is owned by the City or if the City has a right to occupy the property, and if the contractor's presence at that location is connected to a contract with the City; and (iii) elsewhere in the United States where work related to a City contract is being performed. The requirements of this Chapter shall not apply to subcontracts or subcontractors of any contract or contractor.

C. The City Manager or designee will provide a report to the City Council regarding the implementation of this ordinance no later than one year following the effective date of this Ordinance, and will consider among other items, whether the dollar thresholds set forth in subsections (A) and (B) should be modified.

2.73.040 Non-discrimination in provision of benefits.

A. No contractor subject to this Chapter pursuant to Section 2.73.030 shall discriminate in the provision of bereavement leave, family

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medical leave, health benefits, membership or membership discounts, moving expenses, pensions and retirement benefits or travel benefits or in the provision of any benefits other than bereavement leave, family medical leave, health benefits, membership or membership discounts, moving expenses, pensions and retirement benefits or travel benefits between employees with domestic partners and employees with spouses, and/or between the domestic partners and spouses of such employees except as set forth in Subsections 2.73.040.A.1 and 2 below;

1. In the event that the contractor's actual cost of providing a particular benefit for the domestic partner of an employee exceeds that of providing it for the spouse of an employee, or the contractor's actual cost of providing a particular benefit for the spouse of an employee exceeds that of providing it for the domestic partner of an employee, the contractor shall not be deemed to discriminate in the provision of employee benefits if the contractor conditions providing such benefit upon the employee agreeing to pay the excess costs.

2. The contractor shall not be deemed to discriminate in the provision of employee benefits if, despite taking reasonable measure to do so, the contractor is unable to extend a particular employee benefit to domestic partners, so long as the contractor provides the employee with a cash equivalent.

B. Provided that a contractor does not discriminate in the provision of benefits between employees with spouses and employees with domestic partners, a contractor may:

1. Elect to provide benefits to individuals in addition to employees' spouses and employees' domestic partners;

2. Allow each employee to designate a legally domiciled member of the employee's household as being eligible for spousal

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equivalent benefits; or

3. Provide benefits neither to employees' spouses nor to employees' domestic partners.

C. A contractor will not be deemed to be discriminating in the provision of benefits where the implementation of policies ending discrimination in benefits is delayed following the first award of a City contract to a contractor after the effective date of this Chapter:

1. Until the first effective date after the first open enrollment process following the date the contract with the City is executed, provided that the contractor submits evidence that it is making reasonable efforts to end discrimination in benefits. This delay may not exceed two (2) years from the date the contract with the City is executed and only applies to benefits for which an open enrollment process in applicable.

2. Until administrative steps can be taken to incorporate nondiscrimination in benefits in the contractor's infrastructure. The timer allotted for these administrative steps shall apply only to those benefits for which administrative steps are necessary and may not exceed three (3) months. An extension of this time may be granted at the discretion of the City Manager upon the written request of a contractor, setting forth the reasons that additional time is required.

3. Until the expiration of a contractor's current collective bargaining agreement(s) where all of the following conditions have been met:

a. The provision of benefits is governed by one or more collective bargaining agreement(s); and

b. The contractor takes all reasonable measures to end discrimination in benefits by either requesting that the union(s) involved agree to reopen the agreement(s) in order for the contractor to take

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whatever steps are necessary to end discrimination in benefits or by ending discrimination in benefits without reopening the collective bargaining agreement(s); and

c. In the event that the contractor cannot end discrimination in benefits despite taking all reasonable measure to do so, the contractor provides a cash equivalent to eligible employees for whom benefits are not available. Unless otherwise authorized, in writing by the City Manager, this cash equivalent payment must begin at the time the union(s) refuse to allow the collective bargaining agreement(s) to be reopened, or in any case no longer than three (3) months from the date the contract with the City was executed. This cash equivalent payment shall not be required where it is prohibited by federal labor law.

D. Employers subject to this Chapter pursuant to Section 2.73.030 shall give written notification to each current and new employee of his or her potential rights under this Chapter in a form specified by the City. Such notice shall also be posted prominently in areas where it may be seen by all employees.

2.73.050 Required contract provisions.

Every contract subject to this Chapter shall contain provisions requiring it to comply with the provisions of this Chapter as they exist on the date when the contractor entered the contract with the City or when such contract is amended. Such contract provisions may include but need not be limited to the contractor's duty to promptly provide to the City documents and information verifying its compliance with the requirements of this Chapter and sanctions for noncompliance.

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2.73.060 Waivers and exemptions.

A. The City may waive the requirements of this Chapter where the City Manager makes one or more of the following findings:

1. Award of a contract or amendment is necessary to respond to an emergency;

2. The contractor is a sole source;

3. The contractor is a non-profit entity as defined in Section 2.73.020, above;

4. Non compliant contractors are capable of providing goods or services that respond to the City's requirements;

5. The contractor is a public entity;

6. The requirements of this Chapter are inconsistent with a grant, subvention or agreement with a public agency;

7. The City is purchasing through a cooperative or joint purchasing agreement;

8. The contract involves specialized legal services such that it would be in the best interests of the City to waive the requirements of this Chapter, as determined by the City Attorney;

9. The contract involves investment of trust moneys or agreements relating to the management of trust assets, City moneys invested in U.S. government securities or under pre-existing investment agreements, or the investment of City moneys where no person, entity or financial institution doing business with the City which is in compliance with this Chapter is capable of performing the desired transactions or the City will incur financial loss if the requirements of this Chapter are enforced;

10. After taking all reasonable measures to find an entity that complies with this Chapter, the City may waive any or all requirements of this Chapter for any contract or bid package advertised and made

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ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

available to the public, or any competitive or sealed bids received by the City as of the effective date of this Chapter under the following circumstances:

a. There are no qualified responsive bidders or prospective contractors who comply with this Chapter and the contract is for goods, a service or a project that is essential to the City or City residents; or

b. The requirements of this Chapter would result in the City's entering into a contract with an entity that was set up, or is being used for the purpose of evading the intent of this Chapter.

B. The requirements of this Chapter shall not be applicable to contracts executed or amended prior to the effective date of this Chapter, or to bid packages advertised and made available to the public, or any competitive or sealed bids received by the City prior to the effective date of this Chapter, unless and until such contracts are amended after the effective date of this Chapter and would otherwise be subject to this Chapter.

C. The City Manager or designee may issue regulations from time to time implementing the provisions of this ordinance.

D. The City Manager shall report to the City Council annually on the status of waivers and exemptions.

2.73.070 Retaliation and discrimination prohibited.

A. No employer shall retaliate or discriminate against an employee in his or her terms and conditions of employment by reason of the person's status as an employee protected by the requirements of this Chapter.

B. No employer shall retaliate or discriminate against a person in his or her terms and conditions of employment by reason of the person reporting a violation of this Chapter or for prosecuting an action for

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Long Beach, CA 90802-4664

enforcement of this Chapter.

2.73.080 Employee complaints to City.

A. An employee who alleges violation of any provision of the requirements of this Chapter may report such acts to the City. The City Manager may establish a procedure for receiving and investigating such complaints and take appropriate enforcement action.

B. The City shall have the power to examine contractors' benefit programs covered by this Chapter.

C. Any complaints received shall be treated as confidential matters, to the extent permitted by law. Any complaints received and all investigation documents related thereto shall be deemed exempt from disclosure pursuant to California Government Code Sections 6254 and 6255.

2.73.090 Remedies.

A. Upon a finding by the City Manager that a contractor has violated the requirements of this Chapter, the City shall have the rights and remedies described in this Section, in addition to any rights and remedies provided at law or in equity.

1. The City Manager shall be authorized to terminate said contract and bar the contractor from bidding on future contracts with the City for three (3) years from the effective date of the contract termination.

2. In the City Manager's sole discretion, a contractor found to have willfully violated the requirements of this Chapter may be required to pay liquidated damages.

3. The City may seek recovery of reasonable attorneys' fees and costs necessary for enforcement of this Chapter.

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Long Beach, CA 90802-4664

B. Notwithstanding any provision of this Chapter or any other Chapter to the contrary, no criminal penalties shall attach for any violation of this Chapter.

C. No remedy set forth in this Chapter is intended to be exclusive or a prerequisite for asserting a cause of action to enforce any rights hereunder in a court of law. This Chapter shall not be construed to limit an employee's right to bring a common law cause of action for wrongful termination.

D. Nothing in this Chapter shall be interpreted to authorize a right of action against the City.

Section 2. The City Clerk shall certify to the passage of this ordinance by the City Council and cause it to be posted in three (3) conspicuous places in the City of Long Beach, and it shall take effect on the thirty-first (31st) day after it is approved by the Mayor.

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OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

I hereby certify that the foregoing ordinance was adopted by the City Council of the City of Long Beach at its meeting of December 8, 2009, by the following vote:

Ayes: Councilmembers: Garcia, Lowenthal, DeLong, O'Donnell, Schipske, Andrews, Reyes Uranga, Gabelich, Lerch.

Noes: Councilmembers: None.

Absent: Councilmembers: None.

City Clerk

Approved: 12/11/09 (Date)

Mayor

OFFICE OF THE CITY ATTORNEY
ROBERT E. SHANNON, City Attorney
333 West Ocean Boulevard, 11th Floor
Long Beach, CA 90802-4664

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City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

Attachment H

Insurance Requirements

(This replaces the insurance requirements of the Proforma Agreement)

The Awarded Service Provider shall maintain insurance as required in the Insurance Section herein.

City of Long Beach
Purchasing Division
411 West Ocean Boulevard, 6th Floor
Long Beach, CA 90802

INSURANCE: As a condition precedent to the effectiveness of this Agreement, Contractor shall procure and maintain at Contractor's expense for the duration of this Agreement from an insurance company that is admitted to write insurance in the State of California or that has a rating of or equivalent to an A:VIII by A.M. Best and Company the following insurance:

(a) Commercial general liability insurance equivalent in coverage scope to ISO CG 00 01 10 93 naming the **City of Long Beach and its officials, employees, and agents** as additional insureds on a form equivalent in coverage scope to ISO CG 20 10 11 85 from and against claims, demands, causes of action, expenses, costs, or liability for injury to or death of persons, or damage to or loss of property arising out activities performed by or on behalf of the Contractor in an amount not less than One Million Dollars (US $1,000,000) per occurrence and Two Million Dollars (US $2,000,000) in general aggregate.

(b) Workers' compensation coverage as required by the Labor Code of the State of California and Employer's liability insurance with minimum limits of One Million Dollars (US $1,000,000) per accident or occupational illness. The policy shall be endorsed with a waiver of the insurer's right of subrogation against the **City of Long Beach and its officials, employees, and agents.**

(c) Commercial automobile liability insurance equivalent in coverage scope to ISO CA 00 01 06 92 in an amount not less than Five Hundred Thousand Dollars (US $500,000) combined single limit (CSL) covering Symbol 1 ("any auto").

Any self-insurance program or self-insurance retention must be approved separately in writing by City and shall protect the **City of Long Beach and its officials, employees, and agents** in the same manner and to the same extent as they would have been protected had the policy or policies not contained retention provisions. Each insurance policy shall be endorsed to state that coverage shall not be suspended, voided, or canceled by either party except after thirty (30) days prior written notice to City, and shall be primary and not contributing to any other insurance or self-insurance maintained by City.

Any subcontractors which Contractor may use in the performance of this Agreement shall be required to indemnify the City to the same extent as the Contractor and to maintain insurance in compliance with the provisions of this section.

Contractor shall deliver to City certificates of insurance and original endorsements for approval as to sufficiency and form prior to the start of performance hereunder. The certificates and endorsements for each insurance policy shall contain the original signature of a person authorized by that insurer to bind coverage on its behalf. "Claims-made" policies are not acceptable unless City Risk Manager determines that "Occurrence" policies are not available in the market for the risk being insured. In a "Claims-made" policy is accepted, it must provide for an extended reporting period of not less than three (3) years. Such insurance as required herein shall not be deemed to limit Contractor's liability relating to performance under this Agreement. City reserves the right to require complete certified copies of all said policies at any time. Any modification or waiver of the insurance requirements herein shall be made only with the approval of City Risk Manager. The procuring of insurance shall not be construed as a limitation on liability or as full performance of the indemnification provisions of this Agreement.

By submitting a signature below, proposer agrees that insurance requirements can be provided as requested.

Printed Name:	Edward Fusco	Title:	President
Signature:		Date:	12/23/20

CITY OF
LONG BEACH
TECHNOLOGY & INNOVATION

Telecommunications Division

Telecommunication, ICT, and SCS Infrastructure Specification

TECHNOLOGY
& INNOVATION
LONGBEACH

Table of Contents

1 Introduction

1.1 Purpose

The City of Long Beach Telecommunications Division is the Authority Having Jurisdiction (AHJ) for all projects relating to Structured Cabling System (SCS) throughout all City facilities to support the Telecommunications and Information Communication Technology (ICT) infrastructure.

The Telecommunications Division specifies, requires, and provides desirable criteria for vendors and contractors to include material, workmanship, certifications, and warranties.

This document includes the City of Long Beach Telecommunications Division minimum requirements and applies, as possible, the Construction Specifications Institute (CSI) MasterFormat™ Division 27 (Communications) templates, as specified by each manufacturer. Within each section, other MasterFormat™ Divisions may be referenced as applicable. The City of Long Beach Telecommunications Division's specification will take precedence where there may be a contradiction. All questions should be clarified with Telecommunications Division.

All related industry Commissions, Standards Bodies, Institutes, Societies, Alliances, and Associations are referenced within each section of this document.

1.2 Contact Information

City of Long Beach, Technology and Innovation Department
Infrastructure Services Bureau, Telecommunications Division
411 W. Ocean Blvd., 7th Floor. Long Beach, CA. 90802
(562) 570-6774

1.3 Revision

Always consult the City of Long Beach Telecommunications Division regarding the most recent version of this specification. Rev# = yyyy.mm

Rev #	Date	Change	Name
2020.03	13 **March** 2020	Version 1, March 2020	TID-Telecommunications
2020.09	17 **September** 2020	Version 2, September 2020	TID-Telecommunications
2020.10	13 **October** 2020	Version 3, October 2020	TID-Telecommunications

2 City of Long Beach Telecommunications Division Minimum Requirements

2.1 MDF/IDF Room Requirements

2.1.1 Minimum requirements for MDF/IDF room include but not limited to the following:

2.1.1.1 MDF/IDF Room Size

A. Minimum MDF and IDF size for each floor is as follows:
   1. If the gross square foot is 5,000 or less, the IDF shall be 10 ft. long X 10 ft. wide.
   2. If the available floor space is between 5,000 and 8,000 sq. ft., the IDF shall be 12 ft. long X 10 ft. wide.
   3. If the available floor space is between 8,000 and 10,000 sq. ft., the IDF shall be 15 ft. long X 10 ft. wide.
   4. If the available floor space exceeds 10,000 sq. ft., but the horizontal cable placement run distance to the farthest Network Jack does not exceed the cable distance limit of 295 ft. (90 meters), then the IDF size shall be increased in size by 0.75 sq. ft. for every additional 100 sq. ft. of available floor space.
   5. If a second IDF is required to manage the horizontal cable placement run distance limit of 295 ft. (90 meters), size the second IDF per the guidelines explained above.

2.1.1.2 Clearances for equipment and cross-connect

A. Allow a minimum of 36 inches (36") of clear working space in front and 42 inches (42") at rear of equipment racks measured from the front and rear wire managers.
B. Allow for 36-inch depth off wall for wall-mounted equipment.
C. A minimum aisle clearance of 30-inches is required at one end of a equipment rack row.
D. In many cases, equipment and termination hardware may extend beyond racks and backboard mounting surfaces. Clearance is measured from the outermost surface of these devices, rather than from the mounting surface of the rack or backboard.

2.1.1.3 Conduit, Sleeves, and Backboard

A. Minimum of (2) 4' x 8' x ¾" Fire rated backboards Mounted on wall to City specified locations.
B. 4" sleeve on top of each backboard into ceiling space (per 125 cable count)
C. Each drop requires a ¾" EMT conduit or flex conduit accessible from the ceiling with pull rope in each conduit
   a. Conduits are not to be shared with any other drop location
D. At locations where systems furniture is being used, conduits or power poles should be sized to support SYSTIMAX cabling fill ratio.
   a. The City of Long Beach Telecommunications Division will provide specs upon request.

2.1.1.4 Lighting

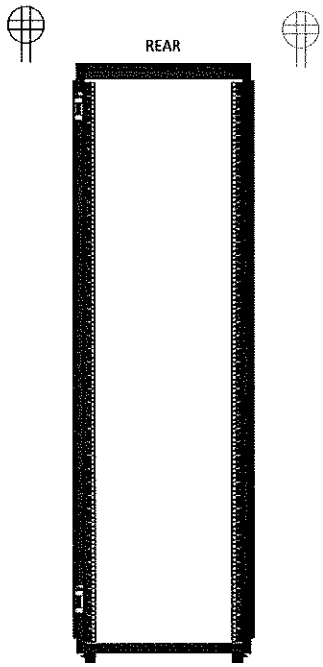
A. Lighting shall provide a minimum light level of 50 fc at desktop level on all sides of the rack equipment.

B. If the building is equipped with a standby power system, lighting should be connected to it, or the should be provided with its own standby lighting in case of power failure.

2.1.1.5 MDF/IDF Electrical Power Requirements

A. Each MDF/IDF room is to have (1) grounding bus bar that is grounded to the building ground.
    1. Installed on City identified backboard wall; level with the Telecommunications Cabling Ladder racks.
B. Wall - Backboard
    1. Provide One (1) quad box on Edison power containing two (2) duplex 20 Amp dedicated circuits, 120V AC on NEMA 5-20R-spade receptacles for each backboard.
    2. When possible Provide One (1) quad box on emergency generator power/building UPS power containing two (2) duplex 20 Amp dedicated circuits, 120V AC on NEMA 5-20R-spade receptacles for each backboard.
        a. If E-Power/UPS is not available Provide One (1) quad box on Edison power containing two (2) duplex 20 Amp dedicated circuits, 120V AC on NEMA 5-20R-spade receptacles for each backboard.
C. 4-Post, 19" Rack – Power requirements
    1. For each 4-post rack (Chatsworth (CPI) 15053-703), provide two (2) quad boxes with two (2) duplex 20-Amp dedicated 120V AC circuits on NEMA 5-20R-spade receptacles – one (1) quad box on each side of the rack. See diagram below (4-Post, 19" Rack – Power requirements.1).
        a. On the rear-**LEFT** side of the 4-post rack, provide one (1) quad box on Utility power (Edison)
        b. On the rear-**RIGHT** side of the 4-post rack, provide one (1) RED quad box on emergency generator power/building UPS power
            1. If E-Power/UPS is not available provide one (1) quad box on Utility power (Edison)
    2. Quad boxes should be suspended above the rear of each 4-post rack – not attached to the rack.
    3. The placement of the Quad boxes and their conduits shall not block or interfere with structured cabling or the rack's equipment mounting area (rails) on either side of rack.

Diagram "4-Post, 19" Rack – Power requirements.1":
4-post Rack with two (2) quad boxes, one per side



D. Uninterruptible Power Supply devices:
    1. A UPS will be installed at the bottom of each rack
    2. The UPS should connect to the building's protected power source (Generator) when available
    3. All rack electronics will terminate: Power Supply-B to the UPS
        a. If a device has only (1) power supply, it will terminate to the UPS
    4. Use APC UPS of this minimum equivalent type
        a. Schneider Electric (APC) SMART-UPS **1500VA** LCD RM 2U 120V WITH NET
        b. Schneider Electric (APC) SMART-UPS **2200VA** LCD RM 2U 120V W/CARD
    5. All UPSs will be configured and network-cabled for Monitoring and Network Management – please consult with the City of Long Beach Telecommunications Division for IP information

E. Power Distribution Units:
    1. A single horizontal, rack-mounted PDU, will be placed on the rear of the 4-post rack, approximately midway up the rack
    2. The PDU will receive building (Utility) power input
    3. All rack electronics will terminate: **Power Supply-A** to the PDU
        a. If a device has only (1) power supply, it will terminate to the UPS
    4. PDU model to be used (or similar spec – can be discussed with City of Long Beach Telecommunications Team):
        a. Schneider Electric (APC) APC AP7800B
            1. Metered, 1U, 15A, 100/120V, (8) 5-15

2.1.1.6 ENVIRONMENTAL REQUIREMENTS

A. HVAC
   1. Each MDF/IDF in a building should have its own dedicated HVAC not connected to or controlled by other building HVAC systems. HVAC must be designed for 24 hours per day, 365 days per year operation and shall have its own thermostat. If the building is supported by a standby power system, consider connecting it to the HVAC system(s) that serve each room.
   2. HVAC systems shall not use the same electrical panel that is used to support the outlets servicing the electronics housed within MDF/IDF.
   3. The temperature in a MDF/IDF shall be maintained in the range of 68°F to 77°F.
   4. The humidity range should be maintained at 30% to 55% relative humidity.
   5. MDF/IDF shall ventilate at the rate of one air change per hour.

2.1.1.7 TELECOMMUNICATION PATHWAY

A. Riser pathway
   1. Riser pathway interconnects the MDF/IDF in a building.
   2. (1) 4" sleeve will be installed from the MPOE to the first IDF. Then each IDF will connect to the one above it with (1) 4" sleeve.

B. Primary horizontal cabling pathways
   1. At a minimum requirement a 2" sleeve is needed for primary horizontal pathways. It will always require pathway fire-wall penetration fire-stop technology through the IDF walls into the occupied space of the floor. Other wall penetrations may be required depending on the wall/ceiling layout of the service area.

2.2 Minimum Network Drop Requirements

A. Minimum requirements for a network drop include but not limited to the following:
   1. The standard (1) drop location contains (2) CAT6 cables in a Single-gang P-Ring (not a Box)
   2. Each drop requires a ¾" EMT conduit or flex conduit accessible from the ceiling with pull rope in each conduit
      a. Conduits are not to be shared with any other drop location
   3. At locations where systems furniture is being used, conduits or power poles should be sized to support SYSTIMAX cabling fill ratio.
      a. The City of Long Beach Telecommunications Division will provide specs upon request.
   4. Cable path hanger rods from all network drops to the MDF/IDF room shall be spaced to prevent cables from sagging or buckling.
   5. Provide 4" sleeves through all fire rated walls, along the cable path, and ensure fire caulking is applied.

2.3 Wireless Access Point Specifications

2.3.1 Device Specification

The City of Long Beach Telecommunications Division will provide the required Access Point device for each application. As of the date this document was written, the following devices are the standard; they fulfill the City of Long Beach's minimum requirements.

A. Indoor:
    1. Cisco Aironet AIR-AP3802I-B-K9
B. Outdoor:
    1. Cisco Aironet AIR-AP**1562**I-B-K9 (Fiber) for >100m applications; 60w
    2. Cisco Aironet AIR-AP**1542**I-B-K9 (Copper) for <100m applications

2.3.2 Deployment

A. The Contractor will install the provided Access Point devices
    1. Contractor to ensure that all required hardware is provided and will install at specified location
B. Coordinate power and cabling needs with the City of Long Beach Telecommunications team
    1. The Network switch must be able to provide PoE+ power for copper applications
C. Height and placement location to be provided by the City of Long Beach Telecommunications team
D. The City of Long Beach will provide a Heat-Map and specific location of the Access Point to be installed
E. Provide signal attenuation concerns to the City of Long Beach Telecommunications Team, that may be caused by buildings, trees, foliage, and weather conditions
F. Ensure that integrated weather and environmentally protected Access Point housing are correctly sealed
G. Ensure proper and secure mounting of the AP device and all hardware
H. Ensure that correct copper cabling is used for either indoor (ISP) or outdoor (OSP) installations
    1. Dual CAT6A CommScope SYSTIMAX cabling drops are to be provided – refer to the CommScope Appendix for part number
    2. The cable shall be 20' looped and then terminated on SYSTIMAX orange inserts (category 6a) and installed with white SMB
    3. The locations shall be marked with a small sticker on the T-bar
I. For locations where cable distance exceeds 100m, Corning fiber optics composite cabling will be required
    1. As needed, The City of Long Beach will provide a 1RU PoE power supply shelf with (6) PSM-I modules is to be installed in the network cabinet

        Model: Corning PSU6-6PS

        Refer to the Corning MasterFormat Section 3.2.15 "26 27 00 Low-Voltage Distribution Equipment" for Low-Voltage device standards

    2. As needed, GPON ONTs will be provided by The City of Long Beach
    3. Refer to the Corning Appendix for cabling part number – distance will determine gauge/cable Part Numbers

2.4 Fiber Optic Specification and Standards

2.4.1 General

A. The specifications provided within this document consists of furnishing and installing all equipment and materials needed to perform and complete the necessary project.

2.4.2 Fiber Optic Cable

A. The fiber optic cable components shall be designed for the intended purpose intended and manufactured by a company regularly engaged in the production of material for the fiber optic industry.
B. All components or assemblies of the same type shall be from the same manufacture.
C. All fiber optic cables shall be listed by UL for the purpose they are providing and shall conform to the NEC standards.

2.4.3 Inside Plant fiber cable, CORNING (Armored)

A. **MIC® 250 Interlocking Armored** Distribution Cable, Plenum 12 F, Single-mode (OS2).
   1. Corning MIC® 250 cables utilize 250 µm color-coded optical fibers surrounded by dielectric strength members with a flexible, flame-retardant outer jacket.
   2. The core is protected by a flexible, spirally-wrapped, aluminum interlocking armor that offers easy, one-step installation.

2.4.4 Inside Plant fiber cable, CORNING (Armored)

A. **ALTOS® Lite Loose Tube, Gel-Free, SingleJacket, Single-Armored Cable** 12 F, Single-mode (OS2).
   1. The single armored construction provides additional crush and rodent protection with a high-strength ripcord under the armor for easy stripping.
   2. The loose tube design provides stable and highly reliable transmission parameters for a variety of voice, data, video and imaging applications.

2.4.5 Outside Plant Fiber Cable

A. **Corning ALTOS® cable with Binderless FastAccess™** technology is an all -dielectric gel -free cable designed for outdoor duct installations **(Part Number: 096ZP4-T3F20D20)**.
   1. The innovative FastAccess™ technology feature combined with the gel -free binderless loose tube design simplifies removal of the cable jacket and accessing the buffer tubes.
   2. The cable is fully water blocked using craft -friendly, water swellable materials, which means no cleanup is required.
   3. The flexible buffer tubes are easy to route in closures, and the SZ -stranded, loose tube design isolates fibers from installation and environmental rigors while allowing easy midspan access.
   4. The all -dielectric gel -free cable construction requires no bonding or grounding, and these cables have a high-density polyethylene jacket that is rugged, durable and easy to handle.
   5. This fiber cable is based on, per project and per application.

2.4.6 Wall-Mountable Connector Housing (WCH)

A. Corning wall -mountable connector housing (WCH Part Number: WCH-02P) product family offers enhanced innovative features that make installation and troubleshooting of fiber optic connectivity faster, easier and more cost -effective.
   1. From fiber and cable routing and strain-relief to port labeling and termination, these housings reduce the risk of error that can disrupt networks.
   2. The WCH housings provide interconnect or cross connect capabilities between the outside plant, riser or distribution cables.

2.4.7 Closet Connector Housing

A. **(CCH Part Number: CCH-01U)** Closet connector housings (CCHs) provide interconnect or cross -connect capabilities between outside plant, riser or distribution cables and opto-electronics. Like other LANscape solutions hardware, the housings accept CCH connector panels. In addition, the housings accept CCH cassettes and CCH modules. From fiber and cable routing and strain relief, to port labeling and termination, these housings reduce the risk of error that can disrupt networks.
   1. The units are designed for rack mounting in 19 -in (48 cm) racks or optional 23 -in (58 cm) equipment racks (1.75 -in EIA hole spacing).
   2. They are available in rack space options of 1U (two panels, cassettes or modules), 2U (four panels, cassettes or modules), 3U (six panels, cassettes or modules) and 4U (12 panels, cassettes or modules).
   3. The 1U, 2U and 3U options feature a slide -out tray and see -through, removable top covers.
   4. The CCH -04U features a clear door, removable front and rear enclosures and a platinum -colored interior for maximum visibility and access.
   5. Every CCH housing is shipped complete with strain relief brackets, routing clips and guides, and mounting brackets for proper installation.
   6. Documentation labels are provided, and components can be added as needed to construct a fiber distribution frame for any application.
   7. All housings include a removable tinted polycarbonate front door.
   8. All size housings have field -installable lock kits available for both front and rear doors.
   9. All CCH housings can also be upgraded for pigtail splicing to full fiber capacity and easy, modular fiber management through the use of CCH Splice Cassettes (CCH -CS), or for easy, modular fiber management when using field -installable connectors through the use of CCH Slack Cassettes (CCH -CF).

2.4.8 CCH Splice Module with Pigtails 12F, LC Duplex, aqua

A. **(Part Number: CCH-CS12-E4-P00QE)** CCH splice modules with pigtails enable faster field splicing and easy modular management of connectorization within the housing.
   1. The CCH splice modules with pigtails are preloaded and pre -routed for quick fusion splicing of either individual or ribbon fiber pigtails, using the same space -saving platform as the standard CCH splice module.
   2. The pre-routed splice modules with pigtails reduce field labor by streamlining the features and components of the pigtail module to allow for efficiencies in the field. They are prepped with a 2-meter pigtail assembly with all pre -existing CCH panel connector options.

3. The splice modules have 900 µm at the connector panel for added durability and colored 250 µm for ease of splicing as well as having strain relief pre -applied to the assemblies from the manufacturing facility.
4. With the splice module, the field will also enjoy the elimination of individual splice trays or separate splice housings, as well as allowing splicing to be done away from the rack housing in a suitable workspace as needed. The modular design makes it easy to access the fiber in an individual module without disturbing the other fibers in the housing.

2.4.9 UniCam® Connector, LC single-mode (OS2) Corning UniCam® high -performance connectors

A. **(Part Number: 95-200-99)** offer best -in -class optical performance in a fast, easy field termination solution. These high -precision zirconia ceramic ferrule connectors assured exceptional insertion loss – 0.1 dB typical/0.5 dB maximum per connector pair for multimode, 0.2 dB typical/0.5 dB maximum per connector pair for single -mode.
   1. Installation of an LC, SC or ST® compatible connector can be accomplished in about 50 seconds to one minute with the UniCam high performance tool kit.
   2. The lightweight, handheld installation tool and high- performance precision cleaver virtually eliminates human variability during installation, ensuring terminations are right the first time, every time.
   3. This kit was designed with consideration for network installers, from the cleaver, with its intuitive, hand -held precision design and dual -clamp precision hold, to the installation tool, with its immediate go/no -go feedback signal indicating proper mating of the field fiber to the fiber stub.
   4. Installation is as easy as strip, clean, cleave, cam and crimp, with exceptional optical performance assured.
   5. Every UniCam® connector is assured to meet the published specification at the time of installation or Corning will replace it.

2.4.10 Single Mode Fiber Optic (SMFO) cables should meet the following requirements:

A. Fiber strand per cable:
   12,24,36,72,96,144 and up to 432 fibers depending on application per project
B. Maximum attenuation:
   < 0.35 dB/km at 1310nm
   < 0.30 dB/km at 1550 nm
C. Cladding diameter: 125.0 microns + 1.0 microns
D. Core Diameter: 8.3 microns nominal
E. Core Eccentricity: < 1.0 micron (0.3 micron typical)
F. Temperature range: -34°C to + 74°C
G. Coating Diameter: 245 ± 10 microns
H. Cable Construction: Loose tube
I. Outer Jacket: Polyethylene
J. Tensile Strength: 600 pounds
K. Central strength member: Dielectric
L. Mode field diameter: 9.3 ± 0.5 microns at 1310 nm
M. Zero dispersion wavelength: 1300 to 1320 nm

N. Zero dispersion slope: ≤ 0.092 picosecond/nm²-km
O. Cutoff wavelength: 1260 nm
P. Point discontinuities at 1300nm: ≤ 0.1 dB
Q. The SMFO cables shall be constructed using reverse oscillation or S-Z stranding to allow a length of buffer tube to be separated from the cable without cutting of the complete tube. Optical fibers shall be distinguishable from others in the same buffer tube by means of color coding according to the following:

1. Blue (BL)	5. Slate (SL)	9. Yellow (YL)
2. Orange (OR)	6. White (WT)	10. Violet (VL)
3. Green (GR)	7. Red (RD)	11. Rose (RS)
4. Brown (BR)	8. Black (BK)	12. Aqua (AQ)

R. The colors shall be targeted in accordance with the Munsell color shades and shall meet EIA/TIA-598A "Color Coding of Fiber Optic Cables." The color formulation shall be compatible with the fiber coating and the buffer tube filling compound and be heat stable. It shall not fade or smear or be susceptible to migration and it shall not affect the transmission characteristics of the optical fibers and shall not cause fibers to stick together. Cables shall be gel free and consistent with a dry water blocking material.
S. The cable shall contain at least one ripcord under the jacket for easy sheath removal. The jacket or sheath shall be marked with the manufacturer's name, the words "Optical Cable" or "Fiber Optic Cable", the number of fibers, "SM" or "Single Mode", year of manufacture, and sequential measurement markings at a minimum of every three feet. The actual length of the cable shall be within 1 percent of the length marking. The marking shall be in a contrasting color to the cable jacket (yellow or white are preferred). The height of the marking shall be approximately one-tenth of an inch.
T. All SMFO cables shall be in accordance with ANSI/ICEA S-87-640 mechanical and environmental specifications and have minimum pull strength of 600 lbf (2700 N) for fiber counts over 12 fibers. All fiber optic cables shall be terminated on SC connectors. Fiber optic cable shall meet the following test requirements:
    1. Pre-Installation Testing:
       A fiber optic reel test shall be provided by the contractor that verifies that the fiber meets loss budgets that are called out in these specifications. The Contractor shall inspect all cable upon delivery and again prior to installation. Any cable that is found to have visual damage shall be tested using an OTDR per the following section prior to installation.
    2. Post-Installation Testing:
       After installation and splicing of cable, but prior to the final splices to the existing 12 SMFO, the contractor shall perform the following tests:

2.4.11 Testing

A. **Power Meter Tests**: Install feed through connectors at all locations where an Ethernet switch is to be connected. Conduct power meter tests for each fiber to demonstrate connectivity and attenuation from origin to destination. Demonstrate that the attenuation for each fiber path including connectors, and splices as, a whole, comply with the loss budgets required by these special provisions.

B. **OTDR Tests**: Conduct bi-directional tests using an OTDR for each fiber. Demonstrate that the attenuation for each fiber and splice, individually, comply with the loss budgets required by these special provisions. Test fibers at 1310 nm and 1550 nm using a launch cable no less than three times the pulse width used to shoot the cable. **Submit OTDR traces for approval**. Clearly annotate each splice and identify the measured loss.
C. The minimum requirements for the Contractor or designated Subcontractor involved in the installation and testing of the fiber optic cable are: Three (3) years' experience in the installation, testing and maintenance of fiber optic cable. Two (2) installations where fiber optic cable was installed, and the network has remained in continuously satisfactory operation for at least two (2) years.
D. The Contractor shall submit as proof, photographs or other support documents, and the names and contact information of the operating personnel who can be contacted regarding the network's operation. The Contractor shall identify any unacceptable losses and make corrective actions at no additional cost. Failed splices may be remade and re-tested for compliance. The Contractor shall replace any cable in its entirety that is not compliant with these special provisions at no additional cost.
E. The contract price paid per linear foot for bid "Fiber Optic Cable" includes full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing SMFO Cable, complete in place, including racks and hooks in pull boxes or splice vaults, termination strips, terminations, labeling, testing, warranty, documentation and spare parts, as shown in the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.
F. Payment to furnish and install fiber optic cable shall be included in the lump sum prices bid and no separate payment shall be made therefor.

2.4.12 Traffic Signal and Communication Pull Boxes.

A. The Contractor shall furnish and install pull boxes as shown on the Plans. Pull boxes shall be No. 6 unless otherwise noted on the Plans and be constructed in accordance with **State Standard Specifications Subsection 86-2.06C**, "*Installation and Use*" and **State Standard Plan No. ES-8**. All No. 6 pull boxes shall be 30 inches in depth and shall have grouted bottoms. Pull boxes shall not be located in or within 1 foot of a curb ramp. Pull box covers shall be labeled with "TRAFFIC SIGNAL" and for each interconnect pull box shall read "COMMUNICATION". All pull box replacements will require the contractor to vertically adjust connecting conduit a distance of 15' in each direction from the pull box.
B. All pull boxes and pull box covers shall be Quazite (or approved equal) polymer concrete reinforced with fiberglass. All units shall utilize stainless steel Penta head bolts. All pull boxes called out in the design that are identified as #5 shall be Tier 15 and #6's shall be Tier 22.
C. Pull boxes and their covers are required to conform to all test provisions of the most current ANSI/SCTE 77 "*Specification for Underground Enclosure Integrity*" for Tier 15 and 22 applications. When multiple "Tiers" are specified the boxes must physically accommodate and structurally support compatible covers while possessing the highest Tier rating. In no assembly can the cover design load exceed the design load of the box. All components in an assembly (box & cover) are manufactured using matched surface tooling. Independent third-party verification or test reports stamped by a registered Professional Engineer certifying that all test provisions of this specification have been met are required with each submittal.
D. All pull box and fiber splice vault locations shall be considered approximate. The Contractor shall **furnish approximately 50' of service loop inside of pull box No.6** (2'x3') in order to comply within

these requirements and the proposed location of the pull box and or fiber splice vault after verification of underground utilities and obtain approval of the location by the Engineer prior to construction.

E. All pull boxes and fiber splice vaults, the locations of which are not shown on the plans, shall be placed within City ROW. All work associated with concrete removal and replacement shall be considered included in the price for pull boxes. No additional compensation will be allowed therefor. The compaction around the box shall not cause the sides to deflect or any part of the box or lid to crack or become dented.
F. **The Contractor shall replace all cracked, broken, chipped or damaged pull boxes or lids at no additional cost to the City.**
G. At locations where the Contractor is required to remove an existing pull box and replace it with a new splice vault, the Contractor shall remove the existing pull box, stone sump, and ground rods and dispose of properly. The new splice vault shall be placed where the old pull box was removed unless otherwise directed by the Engineer. The Contractor shall adhere to the conduit deflection parameters as noted in the Plans and these special provisions when modifying or adding conduit sweep adjustments.
H. At locations where the Contractor is required to make conduit sweep adjustments, the Contractor shall be required to hand dig or chip away the existing concrete encasement around the conduits to achieve the required conduit sweeps into the pull box. The Contractor shall remove the concrete encasement in such a manner that it will not damage the conduit system and its contents. The Contractor shall replace cracked, broken, chipped, or damaged conduit and conduit contents at no additional cost to the City.
I. Pull boxes, pull box covers and pull box extensions shall be concrete or concrete reinforced with fiberglass. Splice vaults shall conform to the requirements as shown on the Plans. Double stacked pull boxes as specified in the plans will be measures as a single unit for payment purposes.
J. Within the pull box, the Contractor shall place the conduit so that the bottom part of the opening is at least 2 inches above the bottom of the pull box and so that the top part of the openings is at least 8 inches from the top of the pull box. The conduit shall be placed to allow the cable to be pulled in a straight line and clear the top of the pull box by 2 inches (angle of exit). Conduits shall terminate within 2 inches of their entry into the pull box.
K. Payment for traffic signal and communication pull boxes shall be included in the lump sum prices bid and no separate payment shall be made therefor.

2.4.13 Fiber Optic Splice Closure (COMMSCOPE FOSC)

A. **FOSC 450** fiber optic splice closures are designed for use most anywhere within the city of Long Beach. project is required along with fiber splicing and storage needs. Per manufacturer recommendations and typical FOSC installation process, the contractor shall flash test the closure to 5 psi. Thoroughly soap seals to check for integrity and leaks.
B. These closures are available in five sizes, each featuring:
    1. Re-usable compressed gel cable sealing components that accommodate a wide range of cable sizes
    2. Capability to accommodate a variety of cable styles including loose tube or central core tube cables with single or ribbon fibers
    3. Hinging splicing trays that provide controlled access to splices and slack storage
    4. Splice and storage compartments accessible via a removable dome-clamp system

5. Thermoplastic outer materials that withstand temperature and contaminate extremes Slack storage baskets of various sizes that provide different slack storage scenarios

END OF SECTION

3 Manufacturer MasterFormat™ Specifications

3.1 COMMSCOPE

COMMSCOPE®

CommScope

MasterFormat

Division 27 Requirements

The intent of this document is to provide customers with assistance in completing the Construction Specifications Institute (CSI) MasterFormat™ template for a CommScope telecommunication cabling system. This document provides the minimum performance criteria for the components and sub-systems comprising a complete cabling system. When the complete telecommunication cabling system is installed by an authorized contractor in accordance with the manufacturer's instructions, the cabling system shall be warranted per the CommScope system performance and component warranties.

Product part numbers, general design considerations, and installation guidelines are provided in this document. This document provides pertinent information to allow the contractor to bid the labor, supervision, tooling, and miscellaneous mounting hardware and consumables to install a complete system. It is the responsibility of the contractor to propose any and all items required for a complete system if not identified in this specification. This document is for planning purposes only and is not intended to modify or supplement any specifications or warranties relating to CommScope products or services.

Revision v1.2v
7-6-2018

COMMSCOPE MASTERFORMAT

3.1.1 27 02 00 General Requirements (Structured Cabling Systems and Pathways and Spaces systems for all Voice and Data systems)

3.1.1.1 27 02 01 Summary

A. The Scope of Work covered by this document is to furnish and install the Structured Cabling Systems and Pathways and Spaces systems for (City of Long Beach). This work will provide for the structured cabling system (SCS) for all Voice and Data systems. Work on this project will commence after the award of the bid to a successful bidder.

B. Contact Information:

Owner's Representative:

Name: Telecommunications Division, Infrastructure Services Bureau
Company: City of Long Beach, Technology and Innovation Department
Address: 411 W. Ocean Blvd., 7th Floor. Long Beach, CA. 90802
Phone: (562) 570-6774

C. Telecommunications system shall include the following systems:
1. Structured Cabling System (SCS) For Telecommunications Systems
2. Pathways for Telecommunications Systems
3. Grounding and Bonding System (GBS) For Telecommunications Systems
4. Firestopping for Telecommunications Systems

3.1.1.2 27 02 05 Additional Requirements

A. **Integration**: Responsibility for overall telecommunications system integration and coordination of work among trades, subcontractors, and suppliers shall rest with Contractor named in construction contract issued by Owner's Representative. Work covered by this division of specifications shall be coordinated with related work indicated on drawings or specified elsewhere under project specifications. Work related to telecommunications system shall be performed under direct supervision of telecommunications system installer in a manner approved by product manufacturer.

B. **APPROVED CONTRACTOR**: The Telecommunications Contractor must be a Certified CommScope SYSTIMAX Installer for the products and/or system being supplied and must be able to demonstrate active CommScope Partner Certification including current completion of CommScope's Design & Engineering Course (SP3321) and Installation & Maintenance Course (SP3361). A current and valid copy of certification of authorization documents must be submitted with the quote in order for such quote to be valid. The Telecommunications contractor is responsible for workmanship and installation practices in accordance with said certification. At least (1) for every (3) members of the copper installation and termination crew must be certified to a Technician Level of training by the product manufacturer or BICSI. At least (1) for every (5) members of the optical fiber installation and termination crew must be certified by Corning or other approved organizations in Optical Fiber installation and termination practices.

C. **Coordination of Work**: Contractor shall be responsible for coordination of work among project specification divisions and contractor/subcontractors involved in this project. This Coordination of Work includes following instructions provided the Construction Manager or General Contractor if project is managed by such. See section 27 02 10 for additional information.

D. **General Compliance Requirements**: Provide a complete and operable system in compliance with project drawings, specifications, referenced standards, applicable building codes, and Authority Having Jurisdiction (AHJ) requirements. Scope of this contract includes planning, design, materials, equipment, labor, configuration, programming, testing, startup and commissioning services, and documentation costs for complete and operable system that meets all requirements indicated on drawings or contained in specifications. Comply with all contract documents, specifications, drawings, manufacturer's instructions, and Owner and AHJ requirements. In case of conflict among applicable documents or standards, contractor shall notify owner's representative in writing of apparent conflict, and then comply with most stringent requirements unless otherwise directed in writing from owner's representative. Work Includes all items required for complete system whether or not identified in specification or drawings.

E. Information about general construction and architectural features and finishes shall be derived from structural and architectural drawings and specifications only.

F. Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.

G. Work related to telecommunications system shall be installed by an SCS manufacturers authorized or certified trained installer and supervised an SCS manufacturers authorized or certified SCS Engineer. Owner reserves the right to review and approves any personnel assigned to this project in a supervisory or managerial role.

H. SCS contractor shall have had at least 10 years of comparable experience with telecommunications projects. As part of the proposal, SCS installer shall submit at least three (3) comparable Project reference descriptions with reference contacts. Comparable projects shall equal or exceed size and complexity of work on drawings.

I. **Complete and Usable Work**: Refer to and comply with requirements in section 27 02 67 outlined below.

- Except where modified by a specific notation to the contrary, it shall be understood that the indication and/or description of any telecommunications item in the drawings and specifications for telecommunications work carries instruction to furnish, install, and connect the item as part of the telecommunications work regardless of whether this instruction is explicitly stated.
- Provide materials and equipment, along with accessories and additional work required for field conditions, and additional work and accessories required for complete, usable, and fully functional construction and systems. City may opt to provide material and equipment.
- Provide a complete and operable system in full compliance with requirements on drawings and specification requirements, including required accessories, devices, equipment, wiring, programming, configuration, and work to provide complete and operable system complying with drawing, specification, and performance requirements.

3.1.1.3 27 02 10 Related Digital Format Documents and Drawings

A. **General**: The project drawings and general conditions of Contract shall apply to this section. All Documents and Drawings must be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach's Infrastructure Services Team.
B. **Coordination**: Coordinate with work specified in other sections and divisions of specifications.
C. **Reference**: Codes and standards as referenced in Section 27 02 20 may define additional specifications or requirements not specifically called out within this division. However, contractor shall adhere to most stringent requirements as defined herein, or as defined by reference within section 27 02 20.
D. Architectural and Engineering specifications may have additional conditions or requirements that affect the work defined by this division of specifications. Contractor shall be responsible for the coordination of all conditions and other trade requirements that may impact schedule, scope of work, work progress, or other factors that may affect the overall ability for contractor to execute the requirements of this division of specifications.

3.1.1.4 27 02 20 Codes and Standards

A. General: All work, including but not limited to: cabling, pathways, support structures, wiring, equipment, installation and workmanship shall comply with the latest editions of the requirements of the Authority Having Jurisdiction (AHJ), National Electrical Code, National Electrical Safety Code, all applicable local rules and regulations, equipment manufacturer's instructions, and the National Electrical Contractors Association (NECA) Standard of Installation. In case of discrepancy or disagreement between the documents noted above, the Contractor shall satisfy the most stringent requirements.
B. Other sections of this document contain References to Codes and Standards that are applicable to the section.

3.1.1.5 27 02 20.20 Codes

A. Insulated Cable Engineers Association (ICEA)

ANSI/ICEA S-80-576-2002, Category 1 & 2 Individually Unshielded Twisted-Pair Indoor Cables for Use in Communications Wiring Systems

ANSI/ICEA S-84-608-2002, Telecommunications Cable, Filled Polyolefin Insulated Copper Conductor

ANSI/ICEA S-90-661-2002, Category 3, 5, & 5e Individually Unshielded Twisted-Pair Indoor Cable for Use in General Purpose and LAN Communication Wiring Systems

ICEA S-102-700-2004, ICEA Standard for Category 6 Individually Unshielded Twisted- Pair Indoor Cables for Use in LAN Communication Wiring Systems Technical Requirements, 2004

B. National Fire Protection Association (NFPA) NFPA 70, National Electrical Code® (NEC®)

NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces, NFPA 72, National Fire Alarm Code®

NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment NFPA 76, Recommended Practice for the Fire Protection of Telecommunications Facilities NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems

NFPA 101, Life Safety Code®

NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials

NFPA 262, Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces

NFPA 780, Standard for the Installation of Lightning Protection Systems NFPA 5000™, Building Construction and Safety Code

3.1.1.6 27 02 20.40 Reference Standards

A. Telecommunications Industry Association (TIA)

B. ANSI/NECA/BICSI 568-2006, Standard for Installing Telecommunications Systems ANSI X3T9.5, Requirements for UTP at 100 Mbps

ANSI/TIA-526.7-A, Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant

ANSI/TIA-568.0-D, Generic Telecommunications Cabling for Customer Premises ANSI/TIA-568.1-D, Commercial Building Telecommunications Cabling Standard

ANSI/TIA-568-C.2, Balanced Twisted-Pair Telecommunication Cabling and Components Standard ANSI/TIA-568.3-D, Optical Fiber Cabling and Components Standard ANSI/TIA-568-C.4, Broadband Coaxial Cabling and Components Standard ANSI/TIA-569-D, Telecommunications Pathways and Spaces

ANSI/TIA-606-C, Administration Standard for Telecommunications Infrastructures ANSI/TIA-862-B, Structured Cabling Infrastructure Standard for Intelligent Building Systems ANSI/TIA-942-B, Telecommunications Infrastructure Standard for Data Centers

J-STD-607-A, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications

T-526-14-C, Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant

TIA-598-D, Optical Fiber Cable Color Coding

TIA-604.3-B, FOCIS 3—Fiber Optic Connector Intermateablility Standard, Type SC

TIA-604.10-B, FOCIS 10—Fiber Optic Connector Intermateablility Standard, Type LC

TIA TSB-125, Guidelines for Maintaining Optical Fiber Polarity Through Reverse-Pair Positioning

TIA-758-B, Customer-owned Outside Plant Telecommunications Infrastructure Standard

TSB-155-A, Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T

C. Other Reference Materials

ANSI/NECA/BICSI-568-2006, Standard, Installing Commercial Building Telecommunications Cabling

BICSI Outside Plant Design Reference Manual (COOSP), current edition.

BICSI Electronic Safety and Security Reference Manual (ESSDRM), current edition

BICSI Information Transport Systems Installation Methods Manual (ITSIM), current edition

BICSI Network Design Reference Manual (NDRM), current edition

BICSI Telecommunications Distribution Methods Manual (TDMM), current edition BICSI Wireless Design Reference Manual (WDRM), current edition

Institute of Electrical and Electronic Engineers (IEEE) National Electrical Manufacturers Association (NEMA)
Underwriters Laboratories (UL) Cable Certification and Follow Up Program

3.1.1.7 *27 02 25 Abbreviations, Acronyms and Definitions*

3.1.1.7.1 27 02 25.20 Abbreviations and Acronyms

ACD	Automatic Call Distribution
AFF	Above Finished Floor
AWG	American Wire Gauge
BICSI	Building Industry Consulting Services International
CAT5	Category 5 Copper Cable
CAT5e	Category 5e Copper Cable
CAT6	Category 6 Copper Cable
CAT6A	Category 6A Copper Cable
CDDI	Copper Distributed Data Interface
CMP	Communications Multipurpose Plenum: cable rating
CMR	Communications Multipurpose Riser: cable rating
EIA	Electronic Industries Association
ELFEXT	Equal-Level Far-End Crosstalk
FEXT	Far End Crosstalk
Gbps	Gigabits per second
HSM	High Speed Migration
HVAC	Heating, Ventilation, and Air Conditioning
IDF	Intermediate Distribution Frame - Termination frames, relay racks, and cable management
IEEE	Institute of Electrical and Electronics Engineers
IM	Information Management
ISDN	Integrated Services Digital Network
LAN	Local Area Network
Mbps	Megabits per second
MDF	Main Distribution Frame, consisting of carrier entrance rooms and head-end
MMF	Multi-mode fiber optics, 50 or 62.5-micron laser optimized core
MUTOA	Multi-User Telecommunications Outlet Assembly
NEXT	Near End Cross Talk
NRTL	Nationally Recognized Testing Laboratories
OSHA	Occupational Safety and Health Act
PBX-	Private Branch Exchange: telephone switch
PDS	Premises Distribution Systems (See SCS)
PoE	Power over Ethernet (IEEE 802.3af)
POP	Point of Presence
PSACR	Power Sum Attenuation-to-Crosstalk Ratio
PSAFEXT	Power Sum Alien Far-End Crosstalk
PSAELFEXT	Power Sum Alien Equal Level Far-End Crosstalk

PSANEXT Power Sum Alien Near-End Crosstalk
PSELFEXT Power Sum Equal Level Far-End Crosstalk
PSNEXTPower Sum Near-End Crosstalk
SCC Security Command Center
SCS Structured Cabling System, or Structure Connectivity System; a complete cabling system
SFF Small Form Factor
SMF Single-mode fiber optics, 8.3-micron core
TC Telecommunications Closet
TE Telecommunications Enclosure
TEF Telecommunications Entrance Facility
TIA Telecommunications Industry Association
TR Telecommunications Room
TO Telecommunications Outlet
UPS Uninterruptible Power Supply
UTP Unshielded Twisted Pair
VoIP Voice over Internet Protocol
WAO Work Area Outlet
WAN Wide Area Network

3.1.1.7.2 27 02 25.40 Definitions

Access Floor - A floor system that has removable floor panels.

Building Backbone Cabling – Cabling used to connect Floor Distributors (FD) or other local collection points to the Building Distributor (BD). Building backbone cabling typically carries aggregate traffic and, as such, impacts multiple network devices and users.
Building backbone cabling may include either fiber optic or copper cabling or both.

Building Distributor (BD) – Termination point from which all building backbone cabling emanates, and interconnection point for the network backbone. Commonly referred to as BDF in Americas, Main Comm Rooms in EMEA and Communication Room, IT Lab or IT Room in AsiaPac. Referred to as BD in international and European industry standards and Intermediate Cross-connect (IC) in American industry standards. There is one BD for each building and it feeds all FD's in the same building. The BD should be located so that all FD's served are within 300 cable meters (984 cable feet). All BD's are linked to the

Campus Backbone Cabling – Cabling used to connect Building Distributors (BD) or other key network segments to the Campus Distributor (CD). With rare exceptions, campus backbone cabling carries aggregate traffic and typically impacts entire buildings worth of network devices and users and, as such, link redundancy with diverse routing is highly recommended. Campus backbone cabling almost exclusively consists of fiber optic cabling. Copper cabling may be used in short-distance (< 90m) applications. In such cases, lightning protection will usually be required by code.

Campus Distributor (CD) – Termination point from which all campus backbone cabling emanates, and highest-level interconnection point for the network backbone. Commonly referred to as NOC in Americas and Main Comm Rooms in EMEA. Referred to as CD in international and European industry standards and Main Cross-connect (MC) in American industry standards. On smaller campuses, there is one CD for the campus. On larger campuses, there might be several CD's with each CD serving several buildings. Besides linking to each of the BD's it serves, the CD is also the network interconnection point for data center links and links to service providers.

Category 6 (Cat 6) / Class E – A category/class of transmission performance that specifies electrical properties up to 250 MHz Refer to the TIA- 568-C family of standards for more information on Category 6 and ISO/IEC 11801 for more information on Class E requirements. Also, refer to CENELEC EN50173.

Category 6A (Cat 6) / Class EA – A category/class of transmission performance that specifies electrical properties up to 500 MHz and capable of supporting data applications operating at 10Gbps. Refer to the TIA-568-C family of standards for more information on Category 6 and ISO/IEC 11801 for more information on Class EA requirements.

Certification – The testing and documentation of the transmission performance (e.g., Category 5e / Class D) of a permanent link or channel, based on sweep frequency (where applicable) testing of numerous parameters with results compared to a range of acceptable values. This project requires 100% certification (with documentation) of all permanent link cabling at the time of installation. Channel certification is optional and is the responsibility of the group using the channel.

Channel – The entire physical pathway between active equipment ports, inclusive of all patch cords, patch panels, jacks and cabling segments.

Class C – A category of transmission performance, defined in ISO and EN standards, that specifies electrical properties up to 16 MHz

Conduit - A raceway of circular cross-section.

Entrance Facility (EF) – Termination point of service provider cables that have entered the building and location of service demarcation point (MPOE) and interconnection point to the network. Commonly referred to as Telco Room in Americas, POP Room in EMEA
and Building Entrance in AsiaPac. Referred to as Building Entrance Facility in international and European industry standards and Entrance Facility (EF) in American industry standards. The EF is linked to the CD, where present, or to the BD.

Floor Distributor (FD) – Termination point for horizontal cabling and interconnection point for network access. Commonly referred to as IDF in Americas and AsiaPac and as Sub Comms Room in EMEA. Referred to as Floor Distributor (FD) in international and European industry standards and Horizontal Cross-connect (HC) - FD quantities and locations are determined by building size and geometry so that all points served are within 90 cable meters (295 cable feet) of an FD. The FD feeds all Telecommunications Outlets (TO's) in its service zone. All FD's in a building are linked to the building's Building Distributor (BD) via backbone cabling.

Horizontal Cabling – Cabling used to connect individual work area outlets to local Floor Distributors (FD) or other collection points. Unlike backbone cabling, horizontal cabling does not typically carry aggregate traffic and, as such, impacts only single network devices or users. In buildings, horizontal cabling almost exclusively consists of copper cabling. Fiber optic cabling may be used where situations dictate but, unlike horizontal copper cabling, horizontal fiber optic cabling is not installed in advance as default building facilities. At this writing, horizontal copper cabling in many networks is capable of supporting Gigabit (1Gb/s) Ethernet applications as well as other applications of similar bandwidth.

Permanent Link – A stationary cabling segment, consisting of the permanently installed cable and the permanently affixed jack at both ends (typically at the outlet faceplate and closet patch panel, or on a patch panel on both ends). The concept assumes that, while patch cords might be disconnected or moved over time, the permanent cable and jacks will not be disturbed, and the electrical characteristics of the permanent link will remain unaltered.

Plenum – A space within the building designed for the movement of environmental air; i.e., a space above a suspended ceiling or below an access floor.

Raceway - Any channel designed for holding wires or cables; i.e. conduit, electrical metal tubing, busways, wireways, ventilated flexible cableway.

Spine – also called a backbone, the main communications cables in an IDF.

3.1.1.8 *27 02 30 Project Drawings*

A. **General Drawing Specifications**: Detail and elevation drawings shall be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach's Infrastructure Services Team. ER, TR and other enlarged detail floor plan drawings shall be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach's Infrastructure Services Team.
B. **Building composite floor plans**: Provide building floor plans showing outlet locations and jack configuration, types of jacks, run distance for each jack cable, and cable routing/locations. Identify TO's that, according to location and available pathway systems, require cable length greater than allowed by standards. Recommend alternatives for Owners Representative's consideration.
C. **Telecommunications space plans/elevations**: Include enlarged floor plans of TRs indicating layout of equipment and devices, including receptacles and grounding provisions. Submit detailed plan views and elevations of telecommunications spaces showing racks, termination blocks, and cable paths.
D. **Logical Drawings**: Provide logical riser or schematic drawings for all systems. Include schematic symbol key.

3.1.1.9 *27 02 50 Substitutions*

A. **Substitution requests**: Substitution requests will be considered only if submitted to Owner's Representative not less than 7 working days prior to project bid date. Acceptance or rejection of proposed substitution is at Owner's Representatives sole discretion. No exceptions. Requests for substitutions shall be considered not approved unless approval is issued in writing by Owner's Representative.

B. **Rejection**: For equipment, cabling, wiring, materials, and all other products indicated or specified as no substitutions or no alternates, Owner does not expect nor desire requests for substitutions and alternate products other than those specified. Owner reserves right for Owner's Representative to reject proposed substitution requests and submissions of alternates without review or justification.

3.1.1.10 27 02 65 Warranty

3.1.1.10.1 27 02 65.10 Contractors Warranty

A. **General requirements**: Comply with additional requirements in contract general requirements and extended warranties required in other specification sections. Refer to all other 27xxx sections for specific additional warranty requirements that exceed or are in addition to those of this section.

B. **Contractor warranty**: Provide all services, materials and equipment necessary for successful operation of entire telecommunications system and SCS system for a period of one year after system acceptance. Scope of warranty includes all equipment, devices, wiring, accessories, software, hardware, installation, programming, and configuration required to maintain a complete and operable system. Provide manufacturer's published recommended preventative maintenance procedures during warranty period. This shall apply to all items except those specifically excluded, or items wherein a longer period of service and warranty is specified or indicated. All warranties shall be effective for one year, minimum, from date Certificate of Final Acceptance is issued. Use of systems provided under this section for temporary services and facilities shall not constitute final acceptance of work nor beneficial use by Owner and shall not institute warranty period. The warranty shall cover repair or replacement of defective materials, equipment, workmanship, and installation that may be incurred during this period. Warranty work is to be done promptly and to Owner's satisfaction. In addition, warranty shall cover correction of damage caused in making necessary repairs and replacements under warranty. Additional warranty responsibilities are:
   1. Obtain written equipment and material warranties offered in manufacturer's published data without exclusion or limitation, in Owner's designated name. Replace material and equipment that require excessive service during guarantee period as determined by Owner.
   2. Provide 2-business day service beginning on date of Substantial Completion and lasting until termination of warranty period. Service shall be at no cost to Owner. Service can be provided by installing contractor or by a separate service organization. Choice of service organization shall be subject to Owner's approval. Submit name and a phone number that will be answered on a 24-hour basis each day of week, for duration of service.
   3. Submit copies of equipment and material warranties to Owner before final acceptance.
   4. At end of warranty period, transfer manufacturers' equipment and material warranties still in force to Owner.
   5. If warranty work problems cannot be corrected immediately to Owner's satisfaction, advise Owner in writing, describing efforts to correct situation, and provide analysis of cause for problem. If necessary to resolve problem, provide at no cost services of manufacturer's engineering and technical staff at site in a timely manner to analyze warranty issues, and develop recommendations for correction, for review and approval by Owner.

C. Owner's rights: This section shall not be interpreted to limit Owner's rights under applicable codes and under this Contract.

D. Pathways Material and Installation warranty: Provide all services, materials and equipment necessary to warrant the installation and performance of all pathway materials for a period of one year after

beneficial use. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide manufacturers published recommended preventative maintenance procedures during warranty period.

E. Grounding and Bonding Material and Installation warranty: Provide all services, materials and equipment necessary for successful operation of GBS for a period of one year after beneficial use. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide manufacturers published recommended preventative maintenance procedures during warranty period.
F. Firestopping Material and Installation warranty: Provide all services, materials and equipment necessary to warrant the performance of all Firestopping material for a period of one year after beneficial use, or longer if required by the local AHJ. Scope of warranty includes all equipment, devices, installation and other work required to maintain a complete and operable system. Provide manufacturers published recommended preventative maintenance procedures during warranty period.

3.1.1.10.2 27 02 65.20 SCS Manufacturers Extended Warranty

A. SCS Systems will be covered by a two-part certification program provided by a single manufacturer and that manufacturer's certified vendor. Manufacturer shall administer a follow-on program through the Vendor to provide support and service to the purchaser. The first part is an assurance program, which provides that the certified system will support the applications for which it is designed, during the 25-year warranty of the certified system.
B. The second portion of the certification is a 25-year warranty provided by the manufacturer and the vendor on all products within the system (cords, telecommunications outlet/connectors, cables, cross-connects, patch panels, etc.).
C. If the certified system ceases to support the certified application(s), whether at the time of cutover, during normal use or when upgrading, the manufacturer and vendor shall commit to promptly implement corrective action.
D. Documentation proving the cabling system's compliance to the End-to-End Link Performance recommendations, as listed in ANSI/TIA-568-C shall be provided by the Vendor prior to the structured cabling system being installed.
E. The cabling system must conform to the current issue of industry standard TIA-568. All performance requirements of this document must be followed. As well, workmanship and installation methods used shall be equal to or better than that found in the BICSI (Building Industry Consulting Service International) ITSIM manual.
F. Purchaser demands strict adherence to the performance specifications listed in ANSI/TIA-568-C series standards.
G. Manufacturer shall maintain ISO Quality Control registration for the facilities that manufacturer the product used in this cabling system.

3.1.1.11 *27 02 67 Completeness of Work*

A. **Complete and usable work**: The contractor is responsible for providing complete and usable work per contract documents. All materials and equipment shall be provided with all accessories and additional work required for field conditions, as well as additional work and accessories required for complete, usable, and fully functional construction and systems, even if not explicitly specified or indicated. Telecommunications system in this Contract shall be provided as complete and operable systems in full

compliance with requirements on drawings and specification requirements. Drawings are diagrammatic, and specifications are performance-based, and Contractor shall provide all work required to comply with drawings and specifications, even if not explicitly indicated or specified. Contractor shall be responsible for coordinating installation of electrical systems with all field conditions and work of other trades. Minimum clearances and work required for compliance with NFPA 70, National Electrical Code® (NEC®), and manufacturer's instructions shall be provided. Comply with additional requirements indicated for access and clearances. Contractor shall verify all field conditions and dimensions that affect selection and provision of materials and equipment, and shall provide any disassembly, reassembly, relocation, demolition, cutting and patching required to provide work specified or indicated, including relocation and reinstallation of existing wiring and equipment. Contractor shall protect from damage resulting from Contractor's operations existing facility, equipment, and wiring. Extra charges for completion and contract time extension will not be allowed because of field conditions or additional work required for complete and usable construction and systems. Comply with additional requirements indicated for access and clearances.

B. **Drawings and specifications form complementary requirements**: provide work specified and not shown, and work shown and not specified as though explicitly required by both. Except where explicitly modified by a specific notation to contrary, it shall be understood that indication or description of any item, in drawings or specifications or both, carries with it instruction to furnish and install item, provided complete.
C. **Terms**: As used in this specification, provide means furnish and install. Furnish means "to purchase and deliver to project site complete with every necessary appurtenance and support," and install means "to unload at delivery point at site and perform every operation necessary to establish secure mounting and correct operation at proper location in project."
D. **Authority approvals**: Give notices, file plans, obtain permits and licenses, pay fees, and obtain necessary approvals from authorities that have jurisdiction as required to perform work per all legal requirements and with Specifications, Drawings, Addenda and Change Orders, all of which are part of Contract Documents.
E. **Supplementary items**: Provide supplementary or miscellaneous items, appurtenances, devices and materials necessary for a sound, secure and complete installation. Examine project drawings and other Sections of specifications for requirements that affect work of this section. Completely coordinate work of this section with work of other Sections and provide a complete and fully functional installation. Refer to all other drawings and other specifications sections that indicate types of construction in which work shall be installed and work of other sections with which work of this section must be coordinated
F. **Quantities**: Items referred to in singular number in Contract Documents shall be provided in quantities necessary to complete work.

3.1.1.12 27 02 70 Project Conditions

A. **Field verification**: Carefully verify location, use and status of all material, equipment, and utilities that are specified, indicated, or deemed necessary for removal. Verify that all materials, equipment, and utilities to be removed are completely inactive and will not be required or in use after completion of project. Replace with equivalent any material, equipment and utilities that were removed by Contractor that are required to be left in place.

B. **Existing utilities**: As applicable, do not interrupt utilities serving facilities occupied by Owner or others unless permitted under following conditions and then only after arranging to provide temporary utility services per requirements indicated:
   1. Notify owner in writing at least 14 days in advance of proposed utility interruptions. Do not proceed with utility interruptions without Owner's written permission.
   2. Equipment installation:
      a. Determine suitable path for moving unit substation into place; consider Project conditions.
      b. Verify clearance requirements and locate equipment to meet installation tolerances.
      c. Revise locations and elevations from those indicated to those required to suit Project.

3.1.1.13 27 02 73 Delivery Storage and Handling

A. **General**: Contractor shall be responsible for the deliveries, storing and handling of all materials relative to the SCS systems, including materials supplied by others that are part of the SCS installation contract. Material shall be stored and protected per manufacturer's instructions. Contractor shall be responsible for the security of all material during installation. For all material provided by contractor, or delivered to contractor on site, contractor assumes full responsibility and liability for any material shortages, damage or loss due to storage and handling methods.

3.1.1.14 27 02 75 Permits and Inspections

A. **General**: All telecommunications systems shall meet or exceed the latest requirements of all national, state, county, municipal, and other authorities exercising jurisdiction over the telecommunications systems and the Project.
B. Contractor shall obtain and pay for all licenses, permits, and inspection fees required by local agencies and/or other agencies having jurisdiction.
C. Contractor agrees to furnish any additional labor or material required to comply with all local and other agencies having jurisdiction at no additional cost.
D. Contractor shall obtain certificates of inspection and approval from all authorities having jurisdiction, and forward copies of same to Owner's Representative prior to request for Project acceptance inspections, completion inspections, substantial completion inspections, and acceptance testing/demonstrations.
E. All required permits and inspection certificates shall be made available at the completion of the telecommunications system installation and commissioning.
F. Any portion of the telecommunications work which is not subject to the requirements of an electric code published by a specific AHJ shall be governed by the National Electrical Code and other applicable sections of the National Fire Code, as published by the National Fire Protection Association (NFPA).
G. Installation procedures, methods and conditions shall comply with the latest requirements of the Federal Occupational Safety and Health Administration (OSHA).

3.1.2 27 04 00 Execution

3.1.2.1 27 04 01 General Requirements

A. **General**: Sequence, coordinate, and integrate various elements of telecommunications system, materials, and equipment. Comply with following requirements as a minimum.
B. Coordinate systems, equipment, and materials installation with other building components.
C. Verify all dimensions by field measurements.
D. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for wiring, cabling, and equipment installations.
E. Coordinate installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
F. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of Work; give particular attention to large equipment requiring positioning prior to closing in building.
G. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide maximum headroom and access for service and maintenance as possible.
H. Coordinate connection of materials, equipment, and systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
I. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by Contract Documents, recognizing that portions of Work are shown only in diagrammatic form. In case of conflict among individual system requirements, request direction in writing from Owner's Representative.
J. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed in both exposed and un- exposed spaces.
K. Install cabling, wiring, and equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
L. Provide access panel or doors where units are concealed behind finished surfaces.
M. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.
N. Comply with all requirements and work indicated on drawings.
O. Avoid interference with structure and with work or other trades, preserving adequate headroom and clearing doors and passageways to satisfaction of Owner and per code requirements.
P. Install equipment and cabling/wiring to properly distribute equipment loads on building structural members provided for equipment support under other Sections. Roof-mounted equipment shall be installed and supported on structural steel or roof curbs as appropriate.
Q. Provide suspended platforms, strap hangers, brackets, shelves, stands or legs as necessary for floor, wall and ceiling mounting of equipment as required.
R. Provide steel supports and hardware for proper installation of hangers, anchors, guides, and other support hardware.
S. Obtain and analyze catalog data, weights, and other pertinent data required for proper coordination of equipment support provisions and installation.
T. Structural steel and hardware shall conform to ASTM standard specifications. Use of steel and hardware shall conform to requirements of AISC Code of Practice: Section Five.

U. Verify site conditions and dimensions of equipment to ensure access for proper installation of equipment without disassembly that would void warranty.

3.1.2.2 27 04 10 Equipment Installation

A. **General**: Install equipment per manufacturer's written instructions. Install equipment level and plumb. Install wiring and cabling between equipment and all related devices.
B. **Mounting**: If neither the Owner's Instructions nor the individual section call out the required hardware mounting, use the following.
    1. For equipment at walls, bolt units to wall or mount on structural steel channel strut bolted to wall
    2. For equipment not at walls, provide freestanding CPI racks fabricated of structural steel members and slotted structural steel channel strut
    3. Use feet consisting of 0.25-inch thick steel plates, 6 square inches, bolted to floor
    4. Use feet for welded attachment of vertical posts not over 3 feet on center
    5. Connect posts with horizontal U channel steel strut and bolt control equipment to channels
C. **Cleaning**: Remove paint splatters and other spots, dirt, and debris. Touch up scratches and mars of finish to match original finish. Clean devices internally using methods and materials as recommended by manufacturer.
D. **Connections**: Tighten wiring connectors, terminals, bus joints, and mountings, to include lugs, screws and bolts per equipment manufacturer's published torque tightening values for equipment connectors. In absence of published connection or terminal torque values, comply with torque values specified in UL 486A and UL 486B.

3.1.2.3 27 04 30 Cutting and Patching

A. **General**: Perform cutting and patching per contract general requirements. In addition, following requirements apply:
    1. Perform cutting, fitting, and patching of electrical equipment and materials required to uncover existing infrastructure to provide access for correction of improperly installed existing or new Work.
    2. Remove and replace defective Work.
    3. Remove and replace Work not conforming to requirements of Contract Documents.
    4. Remove samples of installed Work as specified for testing.
    5. Install equipment and materials in existing structures.
B. **Demolition and removal**: Cut, remove, and legally dispose of selected equipment, components, and materials as indicated, including but not limited to removal of material, equipment, devices, and other items indicated to be removed and items made obsolete by new Work. Provide and maintain temporary partitions or dust barriers adequate to prevent spread of dust and dirt to adjacent areas.
C. **Protection of work**: Protect structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed. During cutting and patching operations, protect adjacent installations. Patch finished surfaces and building components using new materials specified for original installation and experienced Installers.

3.1.2.4 27 04 50 Access and Access Panels

A. **General**: Provide access to materials and equipment that require inspection, replacement, repair or service. Provide access panels and/or doors as required to allow service of all equipment components. Provide access panels where items installed require access and are concealed in floor, wall, furred space or above ceiling. Ceilings consisting of lay-in or removable splined tiles do not require access panels. Locations of equipment requiring access shall be noted on record drawings. Access panels shall have same fire rating classification as surface penetrated.
   1. Coordination: Coordinate and prepare a location, size, and function schedule of access panels required to fully service equipment and deliver to Owner.
   2. Construction: Panels shall be at least 12 inches by 12 inches and located to provide optimum access to equipment for maintenance and servicing. Verify access panel locations and construction with Owner's Representative.

3.1.2.5 27 04 70 Special Responsibilities and Information

A. **Coordination of information**: Cooperate and coordinate with work of other sections in executing work of this section. Perform work such that progress of entire project, including work of other sections, shall not be interfered with or delayed. Provide information as requested on items furnished under this section, which shall be installed under other sections. Obtain detailed installation information from manufacturers of equipment provided under this section.

B. **Information gathering**: Obtain final rough-in dimensions or other information as needed for complete installation of items furnished under other sections or by Owner. Keep fully informed as to shape, size and position of openings required for material or equipment to be provided under this and other sections. Give full information so that openings required by work of this section may be coordinated with other work and other openings and may be provided for in advance. In case of failure to provide sufficient information in proper time, provide cutting and patching or have same done, at no expense to Owner.

C. **Housekeeping pads**: Provide information as requested as to sizes, number and locations of concrete housekeeping pads necessary for floor mounted equipment

D. **Maintenance of equipment and systems**: Maintain equipment and systems until Final Acceptance. Ensure adequate protection of equipment and material during delivery, storage, installation and shutdown and during delays pending final test of systems and equipment because of seasonal conditions.

E. **Use of premises**: Use of premises shall be restricted as directed by Owner's Representative and as required below:
   1. **Cleaning and rubbish removal**: Remove and dispose of dirt and debris and keep premises clean. During progress of work, remove equipment and unused material. Put building and premises in neat and clean condition and do cleaning and washing required to provide acceptable appearance and operation of equipment, to satisfaction of Owner's Representative.
   2. **Rubbish Removal**: Provide for the removal from the site of all spoils, debris, boxes, packaging, crates, and trash generated from the work.

F. **Storage**: Store materials maintaining an orderly, clean appearance. If stored on site in open or unprotected areas, all equipment and material shall be kept off ground by means of pallets or racks and covered with tarpaulins.
   1. **Protection of fireproofing**:

A. Clips, hangers, clamps, supports and other attachments to surfaces to be fireproofed shall be installed, if possible, prior to start of spray fire proofing work.
B. Conduits and other items that would interfere with proper application of fireproofing shall be installed after completion of spray fire proofing work.
C. Patching and repairing of fireproofing due to cutting or damaging to fireproofing during course of work specified under this section shall be performed by installer of fireproofing and paid for by section responsible for damage and shall not constitute grounds for an extra to Owner.

2. **Temporary utilities**: Refer to contract general requirements regarding requirements.
3. **Movement of materials**: Unload materials and equipment delivered to site. Pay costs for rigging, hoisting, lowering and moving equipment on and around site, in building or on roof.

3.1.2.6 27 04 80 Division of Work

A. **General**: Division of work responsibility matrix at the end of this section is for Contractor's reference to clarify roles of various manufacturers, installers, subcontractors, and trades involved in telecommunications system Project.
B. Contractor holding contract with Owner is responsible for coordinating work of all subcontractors to provide a complete and usable Project complying with contract provisions of Project documents.
C. Failure to coordinate work by subcontractors and suppliers will not be considered justification for additional compensation or extension of schedule.

Division of work resonsibility chart

Spec. section	System	Contractors Gen	Elec	Mec	Telecom	Remarks
25 xx xx	Building Automation System (BAS)	1	C	C	C	BAS low voltage cabling by Division 15 uses telcom cable tray.
21 xx xx	Fire Detection And Alarm System (FDAS)	1	C	C	C	Completely separate cabling system and raceways by Division 16
26 xx xx	Electrical wiring (line voltage)	1	2,W	C	C	Completely separate cabling system and raceways by Division 16
26 xx xx	Poke-through fittings and floor boxes	1	2, E	C	C	Telcom to provide data jacks and A-V connectors
26 xx xx	Cable tray	1	2, E	C	C	Comply with Section 27 05 28
26 xx xx	Electrical raceways	1	2, E	C	C	Comply with Section 27 05 28
27 02 00	General requirements for telecommunications system	2	C	C	1	
27 10 00	Structured Cabling System (SCS) for telecommunications systems		C	C	1, E, W	
27 05 28	Pathways for telecommunications systems	1	2, P	C	1	
27 05 26	Grounding and Bonding System (GBS) for telecommunications systems	1	2, G	C	1	
27 05 32	Firestopping for telecommunications systems		2, FP	C	1, FC	

1 = primary contractual responsibility
2 = secondary responsibility
3 = tertiary responsibility
C = coordination of work responsibility
E = provision of specified equipment and devices
W = provision of specified system wiring/cabling
P = provision of specified system pathways/conduits
S = provision of specified system spaces
FP = provision of specified firestopping for pathways
FC = provision of specified firestopping for cabling

END OF SECTION

3.1.3 27 05 00 Common Work Results for Communications

3.1.3.1 *27 05 26 Grounding and Bonding for Communications Systems*

1. *Reference Documentation*

Reference all approved industry standards regarding Grounding and Bonding for Telecommunications racks, cabinets, infrastructure, and electronic specifications

A. TIA-607-B Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
B. ANSI-J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
C. ANSI J-STD 607-B Commercial Building Grounding (Earthing) and Bonding Requirement for Telecommunications
D. ANSI/NECA/BICSI 607:2011 BICSI Standard for Telecommunication Grounding & Bonding, Planning and Installation Methods for Commercial Building
E. NFPA 70:2017 (NEC) National Electrical Code of USA Article 250 & Article 800
F. ISO/IEC 30129:2015 Information Technology - Telecommunications Bonding Networks for Buildings and Other Structures
G. IEEE 1100 Recommended Practice for Power and Grounding Electronic Equipment
H. BICSI Telecommunications Distribution Methods Manual (TDMM), 14th Edition

3.1.3.2 *27 05 29 Hangers and Supports for Communications Systems*

1. *GENERAL*

1.1. Scope of Work

This Section includes the minimum requirements for the support structures for the Communications Systems for the project as outlined in the Bid Document.

A. Non-continuous cable supports (2.3A)
B. Adjustable non-continuous cable support sling (2.3B)
C. Multi-tiered non-continuous cable support assemblies (2.3C)
D. Non-continuous cable support assemblies from tee bar (2.3D)
E. Non-continuous cable support assemblies from drop wire/ceiling (2.3E)
F. Non-continuous cable support assemblies from beam, flange (2.3F)
G. Non-continuous cable support assemblies from C & Z Purlin (2.3G)
H. Non-continuous cable support assemblies from wall, concrete, or joist (2.3H)
I. Non-continuous cable support assemblies from threaded rod (2.3I)
J. Raised floor non-continuous cable support assemblies (2.3J)
K. Cantilever-Mounted Option for non-continuous cable supports (2.3K)
L. Installation accessories for non-continuous cable supports (2.3L)

1.2. Submittals

A. Submit product data on non-continuous cable support devices, including attachment methods. Product data to include, but not limited to materials, finishes, approvals, load ratings, and dimensional information.

1.3. *Quality Assurance*

A. Non-continuous cable support and cable support assemblies shall be listed by Underwriters Laboratories for both Canadian and US standards (cULus).
B. Non-continuous cable supports shall have the manufacturers name and part number stamped on the part for identification.
C. Manufacturer: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience in the industry, and certified ISO 9000.

1.4. Coordination

A. Coordinate installation of hangers, supports, and cables with other trades.

2. PRODUCTS

2.1. Acceptable Manufacturers

A. Subject to compliance with these specifications, non-continuous cable supports shall be as manufactured by: CPI Chatsworth, B-Line, CADDY, HILTI, or equal

2.2. References

ANSI/TIA-568 Commercial Building Telecommunications Cabling Standard
ANSI/TIA-569 Telecommunications Pathways and Spaces
ASTM B633 Standard Specification for Electro-Deposited Coatings of Zinc on Iron and Steel
ASTM B 695-90 Standard Specification for coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A924/A924M Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A109 Standard Specification for Steel, Strip, Carbon, Cold-Rolled
ASTM A167 Standard Specification for Stainless and heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A480/A480M Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.
ASTM A568 Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low- Alloy Hot-Rolled and Cold-Rolled
A653 G60-Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- coated (Galvannealed) by the Hot-Dip process
ASTM A666 Standard Specification for Annealed or Cold-Worked Austenitic Stainless-Steel Sheet, Strip, Plate, and Flat Bar

ASTM A682 Standard Specification for Steel, Strip, High-Carbon, Cold-Rolled, Spring Quality
ASTM A879 Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface
ASTM B117 Standard Method of Salt Spray (Fog) Testing
ASTM D610 Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
UL 2043 - Standard for Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces
NFPA 70 National Electrical Code®

2.3. Non-continuous Cable Support Systems

A. Non-continuous cable supports
   1. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed
   2. Non-continuous cable supports shall have flared edges to prevent damage while installing cables
   3. Non-continuous cable supports sized 1-5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces
   4. Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments
   5. Stainless Steel non-continuous cable supports are intended for indoor and outdoor use in non-corrosive environments or where only mildly corrosive conditions apply
B. Adjustable non-continuous cable support sling
   1. Constructed from steel and woven laminate; sling length can be adjusted to hold up to 425 4-pair UTP; rated for indoor use in non-corrosive environments. Rated to support Category 5e and higher cable, or optical fiber cable; cULus Listed.
   2. Adjustable non-continuous cable support sling shall have a static load limit of 100 lbs.
   3. Adjustable non-continuous cable support sling shall be suitable for use in air handling spaces
   4. If required, assemble to manufacturer recommended specialty fasteners including beam clips, flange clips, C and Z purlin clips.
C. Multi-tiered non-continuous cable support assemblies
   1. Multi-tiered non-continuous cable support assemblies shall be used where separate cabling compartments are required. Assemblies may be factory assembled or assembled from pre-packaged kits. Assemblies shall consist of a steel angled hanger bracket holding up to six non-continuous cable supports, rated for indoor use in non-corrosive environments; cULus Listed.
   2. If required, the multi-tier support bracket may be assembled to manufacturer recommended specialty fasteners including beam clamps, flange clips, C and Z purlin clips.
D. Non-continuous cable support assemblies from tee bar
   1. Tee bar support bracket with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
E. Non-continuous cable support assemblies from drop wire/ceiling
   1. Fastener to wire/rod with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
F. Non-continuous cable support assemblies from beam, flange

1. Fastener to beam or flange with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.

G. Non-continuous cable support assemblies from C & Z Purlin
   1. Fastener to C or Z purlin with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments, cULus Listed
H. Non-continuous cable support assemblies from wall, concrete, or joist
   1. Fastener to wall, concrete, or joist with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments, cULus Listed
I. Non-continuous cable support assemblies from threaded rod
   1. Fastener to threaded rod with one non-continuous cable support, factory or jobsite assembled, rated for indoor use in non-corrosive environments, cULus Listed
   2. The multi-tiered support bracket shall have a static load limit of 300 lbs.
   3. U-hooks and Double J-hook shall attach directly to threaded rod using standard nuts
J. Raised floor non-continuous cable support assemblies
   1. Fastener to raised (access) floor pedestal with one non-continuous cable support, factory or jobsite assembled, rated for indoor use in non-corrosive environments; cULus Listed
K. Cantilever-Mounted cable supports
   1. U-hook shall be able to be assembled to a wide variety of wall mount brackets.
   2. Spacing of individual U-hooks shall be spaced to prevent cables from sagging or buckling.
   3. U-hooks may have the optional attachment of a cable roller for ease in pulling cables
L. Installation accessories for non-continuous cable supports
   1. Cable Pulley
      a. Non-continuous cable supports may be used as an installation tool when a removable pulley assembly is included. The pulley shall be made of plastic and be without sharp edges. The pin and ball assembly must be able to be secured to the J-Hook during cable installation. The pulley must remain secured while cables are being pulled.
      b. The pin and roller assembly must be removed after cables are installed.
   2. Cable Protector
      a. The protective steel tube shall fit over threaded rod and be at least 4" in length.
      b. The tube shall prevent damage to cables placed in or pulled through CAT- CMTM U-hooks. The tube shall not inhibit the pulling of cables.

2.4. Finishes

A. ASTM B633 Standard Specification for Electro-Deposited Coatings of Zinc on Iron and Steel
B. ASTM B 695 Standard Specification for coatings of Zinc Mechanically Deposited on Iron and Steel
C. ASTM A123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
D. ASTM A924/A924M Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
E. Non-continuous cable supports used where only mildly corrosive conditions apply shall be stainless steel, AISI type 304.

3. EXECUTION

3.1. Installation

A. Installation and configuration shall conform to the requirements of the current revision levels of TIA Standards 568 and 569, NFPA 70 (National Electrical Code), applicable local codes, and to the manufacturer's installation instructions.
B. Do not exceed load ratings specified by manufacturer.
C. Adjustable non-continuous support sling shall have a static load limit of 100 lbs.
D. Follow manufacturer's recommendations for allowable fill capacity for each size non- continuous cable support.
E. Locate pathways per Telecommunications Drawings.

END OF SECTION

3.1.3.3 27 05 32 Firestopping for Telecommunications Systems

1. GENERAL

1.1. Scope:

This SECTION describes the requirements for furnishing and installing firestopping for fire-rated construction. This includes all openings in fire-rated floors, walls and other rated elements of construction, both blank (empty) and those accommodating items such as cables, conduits, pipes, ducts, etc.

A. Fireblocking for Concrete Floor or Wall Sleeved Cables.
B. Fireblocking for Gypsum Wall Sleeved Cables.
C. Fireblocking for Concrete Block Wall Sleeved Cables.

1.2. Related Documents:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 7 Specification Sections, apply to this Section.
B. Cable fill calculations must be included to show the maximum cable fill ratio for each Firestopping System and cable type.

1.3. References:

ANSI/TIA 569 - Telecommunications Pathways and Spaces
ANSI/NFPA 70 – National Electrical Code (NEC)
ASTM E-814 - Fire Tests of Through-Penetration Fire Stops
ASTM E-119 - Fire Tests of Building Construction and Materials BOCA – Basic/National Building Code
NFPA 101 - Life Safety Code ICBO – Uniform Building Code
SSBCCI – Standard Building Code
UL 1479 - Fire Tests of Through-Penetration Firestops
UL Fire Resistance Directory – Penetration Firestops System (XHE2) and Fill, Void or Cavity Materials

END OF SECTION

3.1.3.4 27 05 36 Cable Trays for Communications Systems

1. GENERAL

1.1. Scope

A. Continuous, rigid, welded steel or stainless-steel wire mesh cable management system.
B. Cable tray systems are defined to include, but are not limited to, straight sections, supports and accessories.

1.2. Related Documents:

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

1.3. Summary

References:

ANSI/NFPA 70 – National Electrical Code (NEC)
ANSI/TIA-569 - Telecommunications Pathways & Spaces
ASTM A 510 - Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
ASTM A 380 – Specification for Standard Practice for Cleaning, Descaling, and Passivation of Stainless-Steel Parts, Equipment, and Systems
ASTM B 633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM A 123 – Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical) Quality
IEC 61537 (2001) – Cable Tray Systems and Cable Ladder Systems for Cable Management
NEMA VE 1-2002/CSA C22.2 No. 126.1-02 – Metal Cable Tray Systems

END OF SECTION

3.1.3.5 27 05 53 Identification for Communications Systems

1. GENERAL

1.1. Scope of Work

This Section includes the minimum requirements for the Identification and labeling of the Communications Systems for the project as outlined in the Bid Document.

1.2. Summary

A. Administration of the telecommunications infrastructure includes documentation of cables, termination hardware, patching and cross-connection facilities, conduits, other cable pathways, Telecommunications Rooms, and other telecommunications spaces. All facilities shall apply and maintain a system for documenting and administering the telecommunications infrastructure. All documentation must be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach Telecommunications Team.
B. The owner maintains a campus wide labeling scheme for voice and data outlets and patch panels.
C. Industry Labeling Standards and Conventions shall be used unless otherwise stated in the bid documents or by the Owner's Representative.
D. Telecommunications Infrastructure Records must be maintained in a computer spreadsheet, or in a computer database. Documentation must be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach's Infrastructure Services Team.
E. .A cable record is prepared for each backbone cable. The record will show the cable name and must describe the origin point and destination point of the cable. The cable record will record what services and/or connections are assigned to each cable pair or strand. An equipment record is prepared for services distributed from a certain piece of equipment, such as a router, or a system such as the telephone system PBX.
F. Installer shall maintain accurate, up-to-date Installation or Construction Drawings. At a minimum, the Installation Drawings shall show pathway locations and routing, configuration of telecommunications spaces including backboard and equipment rack configurations, and wiring details including identifier assignments.
G. Installer shall provide a complete and accurate set of as-built drawings and must be in Digital format- CAD, PDF, Excel, Visio, or another Digital Format approved by the City of Long Beach's Infrastructure Services Team.
H. The as-build drawings shall record the identifiers for major infrastructure components including; the pathways, spaces, and wiring portions of the infrastructure which may each have separate drawings if warranted by the complexity of the installation, or the scale of the drawings.

1.3. Quality Assurance

A. All labels shall be installed in a neat and workmanlike manner. All methods of labeling that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.

B. Labels shall be of the quality and manufacture indicated. The labels and labeling equipment specified are based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
C. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data labeling.
D. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

TIA-606-C Administration Standards for Telecommunications Infrastructure
TIA-569 Telecommunications Pathway and Spaces
TIA-568 Telecommunications Cabling Standard
BICSI Telecommunications Distribution Methods Manual
UL 969 - UL Standard for Safety for Marking and Labeling Systems

1.4. Submittals

A. Provide product data for the following:
   1. Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5. Coordination

A. Coordinate installation of labels with other trades.
B. Storage and Handling: Avoid breakage, denting and scoring finishes. Damaged products will not be installed. Store materials in original cartons and in a clean dry space; protect from weather and construction traffic. Wet materials will be unpacked and dried before storage.

2. PRODUCTS

2.1. Labels

A. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969
B. Shall be preprinted or computer printed type. Hand written labels are not acceptable
C. Where insert type labels are used provide clear plastic cover over label
D. Outside plant labels shall be totally waterproof even when submerged
E. Equipment Room Copper, Fiber, and Coax Backbone Cable Labels
F. Equipment Room Copper, Fiber, and Coax Horizontal Cable Labels
G. Work Area Copper, Fiber, and Coax Riser Cable Labels
H. Patch Panel Labels

3. EXECUTION

3.1. Identification & Labeling

A. The City of Long Beach Telecommunications Division will specify labeling and identification on a per job basis, following the project award to the vendor/contractor.

B. The size, color, and contrast of all labels should be selected to ensure that the identifiers are easily read. Labels should be visible during the installation of and normal maintenance of the infrastructure.
C. Labels should be resistant to the environmental conditions at the point of installation (such as moisture, heat, or ultraviolet light), and should have a design life equal to or greater than that of the labeled component.
D. All labels shall be printed or generated by a mechanical device.

3.2. Telecommunication Identifiers

A. Refer to the University of Houston Information Technology Telecommunications Infrastructure Standards Manual for labeling practices
B. Outside Plant cabling shall be clearly marked using permanent means. Outside plant shall use the following system of numbering and labeling:
    1. Fiber Optic:
        a. Identify: far-end building name, building number, fiber-type and strand-count
        b. Label at entrance and exit points of tunnel system and at conduit entry points between 12 inches and 36 inches from the conduit or at closet point that is clearly visible and long cable length in tunnel at 200-foot intervals.
        c. Label at termination panels at both ends
    2. Copper:
        a. Identify: far-end building name, building number and strand-count
        b. Label at entrance and exit points of tunnel system and at conduit entry points between 12 inches and 36 inches from the conduit or at closet point that is clearly visible and long cable length in tunnel at 200-foot intervals
C. Riser cabling shall be clearly marked using permanent means. Riser cabling shall use the following system of numbering and labeling:
    1. Fiber Optic:
        a. Identify: far-end EF / ER / TR, fiber-type and strand-count.
        b. When small facilities are fed from a primary location and treated as an ER, riser shall be labeled similar to Outside Plant Fiber Optic
    2. Copper:
        a. Identify: far-end EF / ER / TR and pair-count
        b. Termination points shall be labeled as to actual pair at every fifth (5th) pair-point.

3.3. Labeling Procedures

A. To be consistent with ANSI/TIA standards and industry practices, it is important that both labeling and color coding be applied to all telecommunications infrastructure components. Labeling with the unique identifier will identify a particular component. Proper color coding will quickly identify how that component is used in the overall telecommunications infrastructure of the facility.
B. Visibility and durability:
    1. The size, color, and contrast of all labels should be selected to ensure that the identifiers are easily read. Labels should be visible during the installation of and normal maintenance of the infrastructure.

2. Labels should be resistant to the environmental conditions at the point of installation (such as moisture, heat, or ultraviolet light) and should have a design life equal to or greater than that of the labeled component.
3. Labels are generally of either the adhesive or insert type. All labels must be legible, resistant to defacement, and maintain adhesion to the application surface.
4. Outside plant labels shall be totally waterproof, even when submerged.
5. Labels applied directly to a cable shall have a clear vinyl wrapping applied over the label and around the cable to permanently affix the label.
6. Other types of labels, such as tie-on labels, may be used. However, the label must be appropriate for the environment in which it is used and must be used in the manner intended by the manufacturer.

C. Mechanical generation
   1. All labels shall be printed or generated by a mechanical device.
   2. Hand written labels are NOT acceptable.

END OF SECTION

3.1.4 27 10 00 Structured Cabling

3.1.4.1 27 10 10 General Requirements

A. Transmission performance of structured cabling varies with length, connecting hardware, cords and total number of connections. The installer must take care to properly install the cabling components. To ensure that the installed structured cabling solution meets or exceeds the required performance it must be 'tested' or 'certified'.
B. The requirements for each category of cabling (CAT6, or CAT6A) and optical fiber optics links are located in the ANSI/TIA-568 series standards.
C. Test equipment must meet the requirements set forth in the ANSI/TIA-568 series Standard for Field Test Equipment. All Copper testers shall be Level III. All fiber testers shall meet the requirements in ANSI/TIA-568.
D. Field Power Meters shall meet the following:

    Accuracy ± 0.2 dB
    Resolution 0.01 dB
    Precision ± 0.15 dB

E. The Field light source shall meet the following:

    Accuracy ± 0.01 dB
    Wavelength 850 ± 30 nm
        1300 ± 50 nm
        1310 ± 30 nm
        1550 ± 30 nm

F. The calibration on all test equipment shall be current.
G. The software in all test equipment shall be current.

3.1.4.2 27 10 10 Manufacturers

The following manufacturer's testers are approved.

A. FLUKE
    1. MultiFiber Pro
    2. DTX-CLT CertiFiber Optical Loss Test Set
    3. DSX
    4. Versiv
B. Ideal
    1. LanTEK II
C. Viavi
    1. Certifier
    2. SmartClass Fiber OLTS
D. EXFO
    1. MAXTester
    2. FTB720
E. Or other test equipment approved by CommScope

3.1.4.3 27 10 20 Systems Testing and Documentation

3.1.4.3.1 27 10 20.01 General Requirements

A. Provide installation testing of equipment where required by manufacturer's installation instructions.
B. Provide complete end to end testing for all copper and fiber optic systems/channels based on latest applicable standards. Document all testing and submit with final as- built submittal package. All documentation for systems testing must be in digital format.
C. For all controls and operating equipment, submit equipment/systems to at least three complete operational sequences, in which all equipment operations are tested, observed, and verified.
D. Prior to substantial completion and project acceptance inspection, submit test reports to indicated scope of startup and operational tests, with results of testing for each specified operation. Such test results must be in digital format including if required the test equipment's native format.

3.1.4.3.2 27 10 20.10 Copper Cabling System Testing

A. **General**: Copper cabling shall be tested and certified after installation as follows and as required for cable manufacturer's warranty. Twisted-pair copper cable channels shall be tested for continuity as specified below, presence of ac/dc voltage, and performance. All cabling shall be tested for conformance to horizontal cable specifications as outlined herein and shall be tested per test set manufacturer's instructions utilizing latest firmware and software. Testing shall include all electrical parameters as specified under Product. All cables and termination hardware shall be 100 percent tested by installation contractor for defects in installation and to verify cable performance under installed conditions. All conductors of each installed cable shall be verified useable by Contractor prior to system acceptance. All cables shall be tested per contract documents, manufacturer's warranty provisions, and best industry practices. If any of these are in conflict, Contractor shall comply with most stringent requirements. All defects in cabling system installation shall be repaired or replaced to ensure 100 percent useable conductors in all cables installed, at no additional cost to Owner.
B. Continuity: Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by test unit per manufacturers recommended procedures and referenced to appropriate cable identification number and circuit or pair number. Any faults in wiring shall be corrected and cable re-tested prior to final acceptance.
C. **Length**: Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to maximum distances set forth in ANSI/TIA-568-C standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References. Cable lengths shall be recorded, referencing cable identification number and circuit or pair number. For multi-pair cables, shortest pair length shall be recorded as length for cable.
D. **Factory testing:** Every reel of cable shall be tested by cable manufacturer for all characteristics specified for cable type in this section. This testing shall be performed using a sweep test method and include frequencies specified for cable. A test report shall be available electronically, at no additional cost, for a minimum of five (5) years from the date of manufacture. The test report shall include the reel number, the date of the test, the Lot number, and test results for Return Loss (RL), Insertion Loss

(Attenuation), Pair-to-Pair NEXT, and Power Sum NEXT Pair-to-Pair ELFEXT and Power Sum ELFEXT. The test report shall show the "Worst Case Margin" for the listed transmission characteristics.

E. **Test results**: Test results shall be automatically evaluated by equipment, using most up- to-date criteria from TIA-568-C standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References, and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved.
F. **Test reports**: Test reports for all factory testing and field test reports for copper cabling installation shall be submitted to the Owner's Representative and manufacturer prior to commissioning voice and data system and final contract payment. Refer to Submittals in this Section. Test results must be in digital format and if required in the test equipment's native format.
G. Cable Shall have Online WebTrak Report System Certification capability. For UTP copper cables, include Near End Crosstalk (NEXT), Power Sum Crosstalk (PSNEXT), Equal Level Far End Crosstalk (ELFEXT), Power Sum Equal Level Far End Crosstalk (PSELFEXT), Return Loss, Impedance, Attenuation and propagation delay. For optical fiber cables results to include cable construction and attenuation data for each optical fiber at two (2) test wavelength.

3.1.4.3.3 27 10 20.20 Optical Fiber Cable Testing

A. **General**: Optical fiber cabling shall be tested and certified after installation as described below and as required for cable manufacturer's warranty. Fiber testing shall be performed on all fibers in completed end to end system. Testing shall consist of a bi-directional end to end test in accordance with applicable standards in 27 02 20.20, or a bi-directional end to end test performed by TIA-455-53A and all other applicable standards in 27 02 20.20. The system loss measurements shall be provided at 850 and 1300 nanometers for multimode type glass and 1310 and 1550 nanometers for single-mode type glass. These tests shall also include continuity checking of each fiber. For spans greater than 90 meters, each tested span must test to a value less than or equal to value determined by calculating a link loss budget. For horizontal spans less than or equal to 90 meters, each tested span must be less than or equal to 2.0 decibels. The insertion loss for each mated optical fiber connector pair shall not exceed 0.40 decibels.
B. **Pre-installation testing**: Test all optical fiber cable for all fibers prior to installation of cable.
C. **Performance testing**: Where links are combined to complete a circuit between devices, Contractor shall test each link from end to end to ensure performance of system. Only a basic link test is required. Contractor can optionally install patch cords to complete circuit and then test entire channel. The test method shall be same used for test described above. The values for calculating loss shall be those defined in applicable TIA standards.
D. **Attenuation testing**: Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach test equipment to cable plant. The light source shall be left in place after calibration and power meter moved to far end to take measurements.
E. **Loss budget**: All fiber cabling shall be tested at both wavelengths 850 nm and 1310 nm for multimode and 1300 nm and 1550 nm for single mode.
    1. The link attenuation shall be calculated using:
        a. The following calculation for other installations:

            Link Attenuation Allowance (dB) = Cable Attenuation (dB) + Connector loss (dB) + Splice Insertion Loss (dB)

Where:

Cable attenuation (dB) = Cable attenuation (dB/km) X Length (km)
Connector loss (dB) = Number of Connector pairs X Allowable connector loss (dB) Splice Insertion Loss (dB) = Number of Splices X Allowable Splice loss (dB)

2. **Link loss**: A mated connector to connector interface shall be considered a single connector. Loss numbers for installed link shall be calculated by taking sum of bi- directional measurements and dividing that sum by two. All links not meeting requirements of standard shall be brought into compliance by Contractor, at no additional cost to Owner.
3. **Documentation**: Final documentation shall be submitted to the owner's representative prior to commissioning data system and final contract payment according to Submittals in this section. Documentation must be in digital format.
4. **Test results**: Test results shall be automatically evaluated by equipment, using most up-to-date criteria from all applicable standards specified in 27 02 20.20 and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved. Documentation must be in digital format.
5. **End to End Loss Data**: final documentation shall be submitted to the owner's representative. Documentation must be in digital format.
6. **As Installed/ As Built Diagrams**: Final documentation shall be submitted to the owner's representative. Documentation must be in digital format.

3.1.4.3.4 27 10 20.30 Test Documentation

A. Electronic Format is required
   1. Certification Test Reports shall be submitted in electronic format using the appropriate software supplied by the test equipment manufacturer. The data format should be that of the test report software (i.e. *.flw files for Fluke). The contractor shall provide any necessary software to view and evaluate the test data.
   2. The following list is provided as a reference:

Tester	Test Report Software
Fluke	LinkWare™
Ideal	LanTek® Reporter

   3. One electronic copy of the Test Reports shall be provided.

END OF SECTION

3.1.5 27 11 00 Communications Equipment Room Fittings

3.1.5.1 27 11 16 Communications Racks

1. GENERAL

1.1. Scope of Work

A. This section includes the minimum requirements for the equipment and cable installations in communications equipment rooms (Telecommunications Closets).
B. Included in this section are the minimum composition requirements and installation methods for the following:

1. Communication Racks and Rack Cable Management

1.2. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
B. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling
C. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard,
ANSI/TIA-569 Telecommunications Pathways and Spaces,
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
ANSI-J-STD-607 Joint Standard for Commercial Building Grounding (Earthing)
and Bonding Requirements for Telecommunications
EIA-310-E, Cabinets, Racks, Panels, and Associated Equipment (most recent version)
NFPA 70 National Electric Code
BICSI Telecommunications Distribution Methods Manual

1.3. Submittals

A. The City of Long Beach has standardized on Chatsworth Products for the said items and substitutions will not be accepted without written approval from the City of Long Beach Telecommunications personnel at least 5 days before the project bid due date
   1. Racks and Cable Managers
   2. Cabinets (Floor and Wall)

3. Pathways (Cable Runway and/or Wire Basket)
4. Grounding
5. Industrial/NEMA Rated Enclosures

B. Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid)

2. *PRODUCTS*

2.1 *General*

A. RACKS
1. Racks shall be manufactured from aluminum and/or steel extrusion.
2. Each rack will have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack will assemble with nut and bolt hardware. The base angles will be pre-punched for attachment to the floor.
3. Equipment mounting channels will be punched on the front and rear flange with the EIA-310 Universal Mounting hole pattern.
    a. Aluminum Racks will be threaded with 12-24 roll-formed threads and will include 40 each combination pan head, pilot point mounting screws.
    b. Steel Racks will have 3/8" square holes and will include 40 each #12-24 x ½" mounting screws and 40 each #12-24 cage nuts.
4. The rack will include assembly and equipment-mounting hardware.
5. The rack will be rated:
    a. Four-Post Racks: 2,000 lb. (907.2 kg) of equipment ← preferred
        a. Chatsworth (CPI) 4-post rack: 15053-703
    b. Two-Post Racks: 1,000 lb. (453.6 kg) of equipment ← to be discussed based on clearance
        a. Chatsworth (CPI) 2-post rack: 55053-703
6. The rack will be UL Listed
7. When assembled with top and bottom angles, equipment-mounting channels will be spaced to allow attachment of 19" EIA rack-mount equipment.
8. RACK CABLE MANAGEMENT
    a. Vertical cable management shall have doors that are lightweight, sturdy, and be available in different sizes to allow flexibility in design.
    b. The cable management system shall have a C-Channel bracket that allows for easy access to the cable trough.
    c. The vertical cable management system shall allow tool-less installation of Cable Spool.
    d. Doors shall come standard with on all cable management and be available in both single- and double-sided configurations.
    e. The door shall have dual hinge design that can be opened to the right or left.
    f. The door latching mechanism shall have an easy closing feature.
    g. The door shall have one-point removal and installation process for door.
    h. Horizontal wire managers: The door shall have horizontal cover hinges up or down and be lockable into position with cylindrical finger ends for easy snap on installation
    i. The door shall have a recessed handle to eliminate snag potential for clothes and arms.

j. The Horizontal cable management system shall have an open back on 2U and 3U horizontal troughs for easy pass-through of cables
    a. Manufacturers:
        i. Chatsworth (CPI)
        ii. Panduit

END OF SECTION

27 11 19 Communications Termination Blocks and Patch Panels

1. GENERAL

1.1. Work Includes

A. Provide all labor, material, and equipment for the complete installation of work called for in the Contract Documents.

1.2. Scope of Work

A. This section includes the minimum requirements for Horizontal and Backbone cable terminations installed in communications equipment rooms (Telecommunications Rooms, Equipment Rooms, or "Telecommunications Closets").
B. Included in this section are the minimum composition requirements and installation methods for the following:
   1. Patch Panels

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
B. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
C. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard
ANSI/TIA-569 Telecommunications Pathways and Spaces
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
BICSI - Telecommunications Distribution Methods Manual
CENELEC EN-50173 - Generic cabling systems
ISO/IEC 11801 - Generic cabling for customer premises
J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 National Electric Code

1.4. Submittals

A. Provide product data for the following:

Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

2. PRODUCTS

2.1. Patch Panels

A. Category 5e/Class D Patch Panels – **for existing reference only; all new installations require CAT6 or CAT6A**

1. General specifications: Patch panel shall be constructed of high strength steel with black powder finish and designed for wall or 19-inch rack mounting.
2. Panels shall be available in 24-port and 48-port configurations, with height of 1 Rack Unit (RU) of 44.5 millimeters (1.75 inches) for each group of 24 ports.
3. Removable rear mounted cable management bar and front and rear identification labels.
4. Panel shall support 1 Gb network line speeds.
5. Panel shall be Category 5 and 3 backward compatible.
6. Panel shall comply with the standards for Category 5e/Class D patch panels listed in the TIA-568 Series Standards and ISO/IEC 11801.
7. Panel shall support IEEE 802.3 1000BASE-T plus other legacy LANs and applications.
8. Refer to Appendix 2: CommScope Part Numbers
9. Approved Manufacturer:
   a. CommScope SYSTIMAX Patch Panels

Category 5e Universal Panels CPP-5E-DM-1U-24 (760180000)
Category 5e Universal Panels 1100-U-PS-24 (760182907)
Category 5e Universal Panels CPP-5E-DM-2U-48 (760180018)
Category 5e Universal Panels 1100-U-PS-48 (760182915)

B. Category 6/Class E Patch Panels

1. General specifications: Patch panel shall be constructed of high strength steel with satin chrome finish and designed for wall or 19-inch rack mounting.
2. Panels shall be available in 24-port and 48-port configurations, with height of 1 Rack Unit (RU) of 44.5 millimeters (1.75 inches) for each group of 24 ports.
3. Removable rear mounted cable management bar and front and rear identification labels.
4. Patch panels must be capable of connection to the CommScope Intelligent Patching solution or upgradable to connection to the CommScope Intelligent Patching Solution.
5. Patch panels shall support 5-meter cables in 3 and 4 connector channels, 3-meter cables in 2 connector channels and cross connect cords down to 1 meter.
6. Comply with the standards for Category 6/Class E patch panels listed in the TIA- 568 Series Standards and ISO/IEC 11801.
7. Refer to Appendix 2 CommScope Part Numbers
8. Approved Manufacturer:
   a. CommScope SYSTIMAX Patch Panels

360-IPR-1100-E-GS3-1U-24 (760152561) GigaSPEED XL Cat 6 U/UTP, 24 port
360-IPR-1100-E-GS3-2U-48 (760152579) GigaSPEED XL Cat 6 U/UTP, 48 port

b.CommScope SYSTIMAX Angled Patch Panels

360-IPR-1100A-E-GS3-1U-24 (760151308) GigaSPEED XL Angled Cat 6 U/UTP, 24 port
360-IPR-1100A-E-GS3-2U-48 (760151753) GigaSPEED XL Angled Cat 6 U/UTP, 48 port

C. Category 6A/Class EA Patch Panels
   1. General specifications: Patch panel shall be constructed of high strength steel with satin chrome finish and designed for wall or 19-inch rack mounting.
   2. Panels shall be available in 24-port and 48-port configurations, with height of 1 Rack Unit (RU) of 44.5 millimeters (1.75 inches) for each group of 24 ports.
   3. Removable rear mounted cable management bar and front and rear identification labels.
   4. Patch panels must be capable of connection to the CommScope Intelligent Patching solution or upgradable to connection to the CommScope Intelligent Patching Solution.
   5. Patch panels shall support 5-meter cables in 3 and 4 connector channels, 3-meter cables in 2 connector channels and cross connect cords down to 1 meter.
   6. Comply with the standards for Category 6A/Class EA patch panels listed in the TIA-568 Series Standards and ISO/IEC 11801.
   7. Refer to Appendix 2: CommScope Part Numbers
   8. Approved Manufacturer:
      a.CommScope SYSTIMAX Patch Panels

360-IPR-1100-E-GS6-1U-24 (760152587) GigaSPEED X10D Category 6A U/UTP, 24 port
360-IPR-1100-E-GS6-2U-48 (760152595) GigaSPEED X10D Category 6A U/UTP, 48 port

      b.CommScope SYSTIMAX Angled Patch Panels

360-IPR-1100A-E-GS6-1U-24 (760151324) GigaSPEED X10D Ang Cat 6A U/UTP, 24 port
360-IPR-1100A-E-GS6-2U-48 (760151779) GigaSPEED X10D Ang Cat 6A U/UTP, 48 port

D. High Density CAT6A and CAT6 Modular Patch Panels
   1. General specifications: Patch panel shall be constructed of high strength steel with black powder finish and designed for wall or 19-inch rack mounting.
   2. Panels shall be available in a 48-port configuration, with height of 1 Rack Unit (RU) of 44.5 millimeters (1.75 inches).
   3. Panel shall be designed for CommScope Category 6 and 6A Information Outlets.
   4. Removable rear mounted cable management bar and front and rear identification labels.
   5. Refer to Appendix 2: CommScope Part Numbers
   6. Approved Manufacturer:
      a.CommScope Patch Panel

M4800-1U-GS (760105429) 1U Modular Panel, 48 port, Cat 6A and 6 Info Outlets
M2400-1U-GS (760118323) 1U Modular Panel, 24 port, Cat 6A and 6 Info Outlets

b.CommScope Blank Modular CAT6 and CAT6A Panels

360-E-MOD-2U-48 (760187195) 2U SYSTIMAX 360™ Evolve 48-port flat panel
360-E-MOD-1U-24 (760187187) 1U SYSTIMAX 360™ Evolve 24-port flat panel

3. EXECUTION

3.1. Installation

A. All Patch Panels shall be installed in the racks installed in the telecommunications space.
B. Each patch panel shall be attached to the rack using the four (4) rack screws supplied with the panel
C. All Patch Panels shall be installed level and plum within the racks.
D. Patch Panels shall be installed per the elevation drawings for the Telecommunications space.

END OF SECTION

3.1.6 27 13 00 Communications Backbone Cabling

3.1.6.1 27 13 13 Communication Copper Backbone Cabling

1. GENERAL

1.1. Work Includes

Provide all labor, materials, and equipment for the complete installation of all voice backbone applications called for in the Contract Documents. Provide sufficient pair count to support 100% expansion at the outlet locations.

1.2. Scope of Work

A. This section includes the minimum requirements for Inter and Intra Building Copper Backbone Cables.
B. Included in this section are the minimum composition requirements and installation methods for the following:

Intra-Building Backbone (Inside buildings (ISP))
Inter-Building Backbone (Between buildings (OSP))

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
B. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
C. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

TIA-568 Series Commercial Building Telecommunications Cabling Standard,
TIA-569 Telecommunications Pathways and Spaces,
TIA-606 Administration Standard for the Telecommunications Infrastructure
ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
BICSI – Telecommunications Distribution Methods Manual

1.4. Submittals

A. Cable Manufacturer's data, including part numbers, cut sheets and detailed descriptions, for all proposed equipment
The Contractor shall submit installation plan indicating:
1. Equipment and personnel

2. Materials and staging area
3. Start and completion dates
4. Locations, including floor, room and building

B. The Contractor shall submit a copper cable pulling plan for all multi-pair copper cables with a pair count of 25 pairs or greater, that includes, but is not limited to, the following:
   1. Each cable run and route.
   2. Date and duration of the pull.
   3. Pulling methodology and equipment setups.
   4. Pulling tension calculations for each pull in the run.
   5. Safety issues and precautions to be taken.

C. Product data for all termination and test equipment to be used by Contractor to perform work.
   1. Equipment shall be calibrated with traceability to National Institute of Standards and Technology (NIST) requirements.
   2. Contractor shall include copy of calibration and certification that equipment calibration meets NIST standards and has been calibrated at least once in the previous calendar year.

D. Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

2. EXECUTION

2.1. Installation

A. General - Inter and Intra Building Copper Backbone Cable
   1. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
   2. Provide all necessary products for installation of Copper Backbone cablings to include cable attachments, etc.
   3. Backbone cable shall be installed following industry standard practices.
   4. All Outside Plant Backbone cable shall terminate on Primary protection (per the NEC) upon entering the building.
   5. All installations shall comply with:

      ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard ANSI/TIA-569 Telecommunications Pathways and Spaces
      ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
      BICSI – Telecommunications Distribution Methods Manual
      J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications NFPA 70 – National Electric Code

B. Backbone Cable Testing
   1. Complete end-to-end test results for all copper UTP cables installed are required.
   2. All multi-pair copper cable pairs installed shall be tested to TIA-568A, Category 6 equivalent performance specifications. In addition, provide loop resistance measurements in ohms and dB loss at 1KHz, 8KHz, and 256KHz.

3. The Owner is to be notified at least 24 hours prior to testing to allow observation at the Owner's discretion. If the Owner confirms his intention to observe, a reasonable starting time shall be agreed upon. Should the Owner not be present at the scheduled commencement time, the Contractor may begin testing as scheduled.
4. 100% of all pairs in backbone copper cables shall be tested for continuity and wire-map.
5. Testing Format: Test Results must be submitted in two (2) formats. First, must be original file(s) down loaded from tester. Second, the file must be cohesively placed in Excel format with the following fields:

   ER/TR RM # / RM # of drop / Port # / all relevant test information in as many fields as necessary.
6. All test results are to be recorded and submitted to the Owner.

C. Cable and Termination Panel Labeling

   Label the installed cables in accordance with Section 27 05 53

D. Cable Support
   1. Provide cable supports and clamps to attach cables to backboards and walls.
   2. Attach horizontal and vertical backbone cables at 2-foot intervals using Owner approved supports; such as D-rings or jumper troughs utilized for wire management.
   3. Attach cables to manhole racks using Owner approved methods
   4. Backbone cabling shall be secured to the cable/ladder tray following manufacturer recommended procedures, and appropriate installation hardware and methods as defined by local code or the authority having jurisdiction (AHJ).

E. As-built Drawings
   1. CAD Files: Provide CAD files in dwg or dgn formats showing floor plans with room numbers and actual backbone cabling and pathway locations and labeling. The deliverable is required within 5 business days of final cable testing.
   2. Red Line Drawings: Contract must keep one (1) E size set of floor plans on site during work hours showing installation progress marked and backbone cable labels noted. Contractor may be asked to produce these drawings for examination during construction meetings or field inspections.

END OF SECTION

3.1.7 27 15 00 Communications Horizontal Cabling

3.1.7.1 27 15 13 Communication Copper Horizontal Cabling

1. GENERAL

1.1. Work Includes

Provide all labor, materials, and equipment for the complete installation of all Copper Horizontal Cabling applications called for in the Bid Documents.

1.2. Scope of Work

A. This section includes the minimum requirements for Copper Horizontal Cables.
B. Horizontal (to desktop) cable shall consist of Category 6 or 6A copper cable for all Data and Voice applications.
C. At corporate, engineering and campus facilities, horizontal cabling to typical work area outlets (including offices, cubicles and conference rooms) shall consist of two (2) Category 6 cables serving each outlet.
D. Outlets for wall-mounted or other "telephone only" installations shall consist of one Category 6 cable as a minimum.
E. Outlets for wireless access points (APs) shall consist of two Category 6A cables as a minimum.

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
B. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
C. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard
ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
ANSI/TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and
ANSI/TIA-569 Telecommunications Pathways and Spaces
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
ANSI-J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
BICSI – Telecommunications Distribution Methods Manual Components Standards
NFPA 70 – National Electric Code

ISO/IEC 11801 - Generic Cabling for Customer Premises
CENELEC EN-50173 - Generic Cabling Systems

1.4. Cable Construction (by Type):

A. Listed CMR cable: Solid copper conductors with high-density polyolefin insulation and an overall low smoke polyvinyl chloride (PVC) jacket to achieve a riser (i.e., non- plenum) rating by applicable NEC requirements.
B. Listed CMP cable: Solid copper conductors with fluorinated ethylene propylene (FEP) insulation and an overall low smoke PVC jacket to achieve plenum rating by applicable NEC requirements.
C. LSZH cable: Solid copper conductors with non-halogen high-density polyethylene (HDPE) insulation and a low smoke, zero halogen, compound jacket to achieve a LSZH rating by applicable IEC standards
D. LC cable: Solid copper conductors with FEP fluoropolymer insulation and overall FEP fluoropolymer jacket to achieve CMP 50 rating by UL standards
E. OSP outdoor cable rated for wet locations: Solid copper conductors with polyethylene insulation, polyolefin fluted center member with flooding compound, and black polyethylene jacket
F. Comply with following general physical specifications:
    1. Maximum pulling tension: 110 Newton's (25 pound-force)
    2. Operating temperature: –20 to 60 degrees C [–4 to 140 degrees F]

1.5. Submittals

Provide product data for the following:

Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.6. Coordination

Coordinate layout and installation of cable tray with other trades.

2. PRODUCTS

2.1. Data Communications Horizontal & Backbone High-Count 25 Pair Cabling (Category 5E)

A. All Cables shall be of round construction
B. Each cable shall contain 25 color coded pairs
C. Cable shall be listed for the environment where it will be installed (Plenum, Riser, LSZH, etc.)
D. Refer to Appendix 2: CommScope Part Numbers
E. Approved Manufacturer:
    1. 874020906/10- CommScope CS24 Category 5E 25-Pair Cable
    2. 884021305/10 - CommScope CS24 Category 5E 25-Pair Cable

F. Cable shall meet the Electrical Specifications herein:

Electrical Specifications	
ANSI/TIA Category	5e
Characteristic Impedance	100 ohm
dc Resistance Unbalance, maximum	5 %
dc Resistance, maximum	9.38 ohms/100 m
Delay Skew, maximum	15 ns
Dielectric Strength, minimum	1500 Vac | 2500 Vdc
Mutual Capacitance at Frequency	5.6 nF/100 m @ 1 kHz
Nominal Velocity of Propagation (NVP)	71 %
Operating Frequency, maximum	100 MHz
Operating Voltage, maximum	80 V
Remote Powering	Fully complies with the recommendations set forth by IEEE 802.3bt (Type 4) for the safe delivery of power over LAN cable when installed according to ISO/IEC 14763-2, CENELEC EN 50174-1, CENELEC EN 50174-2 or TIA TSB-184-A
Transmission Standards	ANSI/TIA-568-C.2 | CENELEC EN 50288-3-1 | ISO/IEC 11801 Class D
Safety Voltage Rating	300 V

Freq. MHz	IL	NEXT	ACR	PSNEXT	PSACR	ACRF	PSACRF	RL
	Std	Std	Std	Std	Std	Std	Std	Std
1	2.0	65.3	63.3	62.3	60.3	63.8	60.8	20.0
4	4.1	56.3	52.2	53.3	49.2	51.8	48.8	23.0
8	5.8	51.8	46.0	48.8	43.0	45.7	42.7	24.5
10	6.5	50.3	43.8	47.3	40.8	43.8	40.8	25.0
16	8.2	47.2	39.0	44.2	36.0	39.7	36.7	25.0
20	9.3	45.8	36.5	42.8	33.5	37.8	34.8	25.0
25	10.4	44.3	33.9	41.3	30.9	35.8	32.8	24.3
31.25	11.7	42.9	31.2	39.9	28.2	33.9	30.9	23.6
62.5	17.0	38.4	21.4	35.4	18.4	27.9	24.9	21.5
100	22.0	35.3	13.3	32.3	10.3	23.8	20.8	20.1

1. General specifications: Cable shall have UTP configuration, round overall cable geometry, and pairs of #24 AWG (0.511 millimeters). Provide specified or indicated cable type. Cable color shall be specified or selected by Owner's Representative from manufacturer's standard colors.
2. Comply with following cable construction specifications by type:
   a. UL-listed CMR cable: Solid copper conductors with high-density polyolefin insulation and an overall low smoke PVC jacket to achieve riser (i.e., non-plenum) rating by UL standards

      Approved product:

      CommScope Solutions CS24 Category 5E 25-Pair Cable

   b. NFPA 262 listed CMP cable: Solid copper conductors with FEP insulation and overall low smoke PVC jacket to achieve plenum rating by NFPA 262
3. Comply with following general physical specifications:
   a. Maximum pulling tension: 110 newtons (25 pounds-force)
   b. Operating temperature: –20 to 60 degrees C (–4 to 140 degrees F)
4. Comply with following cable performance specifications:
   a. Data shall be guaranteed performance for worst-case channels utilizing 4-pair series cables with full cross-connects, CPs, and work area outlets (i.e., 4 connectors in a channel) for length up to 100 meters (328 feet).
5. Cable geometry, and pairs of #24 AWG (0.511 millimeters).

a. Cable pair counts shall be as follows:
b. 25, 50, 100, 200, 300, 400, 600, 900, 1200, 1500, and 1800.
c. Provide specified or indicated cable type.
d. Cable color shall be dark grey.

G. High-pair count riser cable
   1. General specifications: Cable shall have UTP configuration, round overall cable geometry, and pairs of #24 AWG (0.511 millimeters).
      a. Cable pair counts shall be as follows:
         25, 50, 100, 200, 300, 400, 600, 900, 1200, 1500, and 1800.
      b. Provide specified or indicated cable type.
      c. Cable color shall be dark grey.
   2. Comply with following general physical specifications:
      a. UL-listed CMR cable: Solid copper conductors with high-density polyolefin insulation and overall low smoke PVC jacket to achieve a riser (i.e., non-plenum) rating by UL standards
      b. Comply with following general physical specifications:
         1. Maximum pulling tension: 110 newtons (25 pounds-force)
         2. Operating temperature: -20 to 60 degrees C (-4 to 140 degrees F)
   3. Comply with following cable performance specifications. Data shall be guaranteed performance for worst-case channels utilizing 4-pair series cables with full cross-connects, CPs, and work area outlets (i.e., 4 connectors in a channel) for length up to 100 meters (328 feet).

2.2. Data Communications Horizontal Cabling (Category 6/Class E)

A. Category 6/Class E Unshielded Twisted-Pair (UTP) Cable
   1. All Cables shall be of round construction
   2. Each cable shall contain 4 color coded pairs
   3. Cable shall be listed for the environment where it will be installed, and available options shall include Plenum, Riser, LSZH, Outdoor, Indoor/Outdoor versions.
   4. Refer to Appendix 2: CommScope Part Numbers
   5. Approved Manufacturer:
      a. CommScope SYSTIMAX GigaSPEED XL CAT6

PLENUM	
Product #	Material ID
2071E LB 4/23 W1000	760191833
2071E BL 4/23 W1000	700208093
2071E WH 4/23 W1000	700208101
2071E YL 4/23 W1000	700210123
2071E SL 4/23 W1000	700214372
2071E OR 4/23 W1000	700210024

NON-PLENUM	
Product #	Material ID
1071E LB 4/23 W1000	700211964
1071E BL 4/23 W1000	760004689
1071E WH 4/23 W1000	700212046
1071E YL 4/23 W1000	700211998
1071E SL 4/23 W1000	700211931
1071E OR 4/23 W1000	700212103

2071E LL 4/23 W1000	700210214
2071E RD 4/23 W1000	700210263
2071E BK 4/23 W1000	700210230
2071E SG 4/23 W1000	700210164

1071E LL 4/23 W1000	700212095
1071E RD 4/23 W1000	700212020
1071E BK 4/23 W1000	700212129
1071E SG 4/23 W1000	700212061

b.CommScope Indoor/Outdoor CAT6 CS34P-IO

CS34P-IO (874049304/10) Category 6 U/UTP 4/23 Indoor/Outdoor, BLACK

c. CommScope SYSTIMAX Outdoor OSP CAT6

1571A BK 4/24 R1000 (760008888) Category 6 GigaSPEED XL® U/UTP OSP, BLACK
1571A BK 4/24 R3000 (760090043) Category 6 GigaSPEED XL® U/UTP OSP, BLACK

B. Category 6 horizontal cabling shall provide the following Margin to the specification when installed in a 4 connector Channel:

Electrical Parameter (1-250MHZ)	Guaranteed Margins to Category 6 Class E Channel Specifications
Insertion loss	5%
NEXT	6 dB
PSNEXT	7.5 dB
ELFEXT	6 dB
PSELFEXT	8 dB
Return Loss	4 dB

C. Category 6 horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

Guaranteed Channel Performance Specifications for 4-Connection GigaSPEED XL7 U/UTP Systems										
Freq (MHz)	Insertion Loss (dB)	NEXT (dB)	ACR (dB)	PSNEXT (dB)	PSACR (dB)	ELFEXT (dB)	PSELFEXT (dB)	Return Loss (dB)	Delay (ns)	Delay Skew (ns)
1.0	2.0	71.0	69.0	69.5	67.5	69.3	68.3	23.0	580	30

4.0	3.8	69.0	65.2	68.0	64.2	57.2	56.2	23.0	562	30
8.0	5.4	64.2	58.8	63.1	57.7	51.2	50.2	23.0	557	30
10.0	6.0	62.6	56.6	61.5	55.5	49.3	48.3	23.0	555	30
16.0	7.6	59.2	51.6	58.1	50.4	45.2	44.2	22.0	553	30
20.0	8.6	57.6	49.1	56.5	47.9	43.2	42.2	21.5	552	30
25.0	9.6	56.0	46.4	54.8	45.2	41.3	40.3	21.0	551	30
31.25	10.8	54.4	43.6	53.2	42.4	39.4	38.4	20.5	550	30
62.5	15.6	49.4	33.7	48.1	32.4	33.3	32.3	18.0	549	30
100.0	20.2	45.9	25.7	44.6	24.3	29.3	28.3	16.0	548	30
200.0	30.0	40.8	10.8	39.4	9.4	23.2	22.2	13.0	547	30
250.0	34.1	39.1	5.0	37.7	3.5	21.3	20.3	12.0	546	30

1. The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.
2. All values and equations apply to worst-case channels utilizing four-pair 71E series cables with full cross-connects, consolidation points and work area outlets (4 connectors in a channel) for any channel lengths up to 100 meters.

D. Category 6 horizontal cabling shall provide the following Margin to the specification when installed in a 6 connector Channel

Electrical Parameter (1-250MHZ)	Guaranteed Margins to Category 6 Class E Channel Specifications
Insertion loss	4%
NEXT	4 dB
PSNEXT	5.5 dB
ELFEXT	4 dB
PSELFEXT	6 dB
Return Loss	2 dB

E. Category 6 horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 6 connector Channel.

Guaranteed Channel Performance Specifications for 6-Connection GigaSPEED XL7 U/UTP Systems

Freq (MHz)	Insertion Loss (dB)	NEXT (dB)	ACR (dB)	PSNEXT (dB)	PSACR (dB)	ELFEXT (dB)]	PSELFEXT (dB)	Return Loss (dB)	Delay (ns)	Delay Skew (ns)
1.0	2.1	69.0	66.9	67.5	65.4	67.3	66.3	21.0	580	30
4.0	3.9	67.0	63.2	66.0	62.1	55.2	54.2	21.0	562	30
8.0	5.4	62.2	56.7	61.1	55.7	49.2	48.2	21.0	557	30
10.0	6.1	60.6	54.5	59.5	53.4	47.3	46.3	21.0	555	30
16.0	7.7	57.2	49.5	56.1	48.4	43.2	42.2	20.0	553	30
20.0	8.7	55.6	47.0	54.4	45.8	41.2	40.2	19.5	552	30
25.0	9.7	54.0	44.3	52.8	43.1	39.3	38.3	19.0	551	30
31.25	10.9	52.4	41.5	51.2	40.3	37.4	36.4	18.5	550	30
62.5	15.8	47.4	31.6	46.1	30.3	31.3	30.3	16.0	549	30
100.0	20.4	43.9	23.5	42.6	22.1	27.3	26.3	14.0	548	30
200.0	30.3	38.8	8.5	37.4	7.1	21.2	20.2	11.0	547	30
250.0	34.5	37.1	2.6	35.7	1.2	19.3	18.3	10.0	546	30

1. The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.
2. All values and equations apply to worst-case channels utilizing four-pair 71E series cables with up to 6 embedded connections in a channel for any channel lengths up to 100 meters.

2.3. Data Communications Horizontal Cabling (Category 6A/Class EA)

A. Category 6 Augmented (6A)/Class EA Unshielded Twisted-Pair (UTP) Cable
   1. All Cables shall be of round construction
   2. Each cable shall contain 4 color coded pairs
   3. Cable shall be listed for the environment where it will be installed, and available options shall include Plenum, Riser, LSZH, Outdoor, Indoor/Outdoor versions.
   4. Refer to Appendix 2: CommScope Part Numbers
   5. Approved Manufacturer:
      a. CommScope SYSTIMAX GigaSPEED X10D

PLENUM	
Product #	Material ID
2091B LB 4/23 W1000	760154039
2091B BL 4/23 W1000	760107201

NON-PLENUM	
Product #	Material ID
1091B LB 4/23 W1000	760107102
1091B BL 4/23 W1000	760107094

2091B WH 4/23 W1000	760107268
2091B YL 4/23 W1000	760107276
2091B SL 4/23 W1000	760107250
2091B OR 4/23 W1000	760107227
2091B PK 4/23 W1000	760118497
2091B RD 4/23 W1000	760107243
2091B BK 4/23 W1000	760185900
2091B GR 4/23 W1000	760107219

1091B WH 4/23 W1000	760107144
1091B YL 4/23 W1000	760107151
1091B SL 4/23 W1000	760107078
1091B OR 4/23 W1000	760107128
1091B PK 4/23 W1000	760188276
1091B RD 4/23 W1000	760107136
1091B BK 4/23 W1000	760107086
1091B GR 4/23 W1000	760107110

b. CommScope Indoor/Outdoor CAT6A CS44P-IO

CS44P-IO (874036404/10) Category 6A U/UTP 4/23 Indoor/Outdoor, BLACK

c. CommScope SYSTIMAX OSP F/UTP CAT6A

1592A BK 4/24 R1000 (760178129) 1592A Category 6A F/UTP Cable, outdoor, black jacket, aluminum tape

B. Category 6A horizontal cabling shall provide the following Margin to the specification when installed in a 4 connector Channel.

Electrical Parameter (1-250MHZ)	Guaranteed Channel Margins to Amendment 1 to ISO/IEC 11801:2002 "Class EA"
Insertion loss	3%
NEXT	3 dB
PSNEXT	5 dB
ACR-N	5 dB
PSACR-N	6.5 dB
ACR-F	6 dB
PSACR-F	8 dB
Return Loss	1 dB
Return Loss, PSANEXT, PSAACR-F, Avg. PSANEXT, Avg. PSAACR-F	2 dB

C. Category 6A horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

Guaranteed Channel Performance Specifications for 4-Connection GigaSPEED 360X10D U/UTP Systems														
Freq (MHz)	Insertion Loss (dB)	PS ANEXT (dB)	Avg. PS ANEXT (dB)	PS AACR-F (dB)	AVG. PS AACR-F (dB)	NEXT (dB)	ACR-N (dB)	PS NEXT (dB)	PS ACR-N (dB)	ACR-F (dB)	PS ACR-F (dB)	Return Loss (dB)	Delay (ns)	Delay Skew (ns)
1	2.2	82.0	84.3	79.0	83.0	75.7	73.5	75.3	73.1	69.3	68.3	20.0	580	40
4	4.0	76.0	78.2	67.0	71.0	66.0	62.0	65.5	61.5	57.2	56.2	20.0	562	40
8	5.6	73.0	75.2	60.9	64.9	61.2	55.5	60.6	55.0	51.2	50.2	20.0	557	40
10	6.3	72.0	74.3	59.0	63.0	59.6	53.3	59.0	52.7	49.3	48.3	20.0	555	40
16	7.9	70.0	72.2	54.9	58.9	56.2	48.3	55.6	47.7	45.2	44.2	19.0	553	40
20	8.9	69.0	71.2	53.0	57.0	54.6	45.7	54.0	45.1	43.2	42.2	18.5	552	40
25	9.9	68.0	70.3	51.0	55.0	53.0	43.1	52.3	42.4	41.3	40.3	18.0	551	40
31.3	11.1	67.0	69.3	49.1	53.1	51.4	40.3	50.7	39.6	39.3	38.3	17.5	550	40
62.5	15.9	64.0	66.3	43.1	47.1	46.4	30.5	45.6	29.7	33.3	32.3	15.0	549	40
100	20.3	62.0	64.3	39.0	43.0	42.9	22.7	42.1	21.8	29.3	28.3	13.0	548	40
200	29.2	57.5	59.7	33.0	37.0	37.8	8.6	36.9	7.7	23.2	22.2	10.0	547	40
250	32.9	56.0	58.3	31.0	35.0	36.1	3.2	35.2	2.3	21.3	20.3	9.0	546	40
300	36.2	54.8	57.1	29.5	33.5	34.7	-1.5	33.8	-2.5	19.7	18.7	8.2	546	40
400	42.3	53.0	55.2	27.0	31.0	32.6	-9.8	31.6	-10.8	17.2	16.2	7.0	546	40
500	47.8	51.5	53.8	25.0	29.0	30.9	-17.0	29.8	-18.0	15.3	14.3	7.0	546	40

1. The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.
2. All values and equations apply to worst-case channels utilizing four-pair 91A series cables with full cross-connects, consolidation points and work area outlets (4 connections in a channel) for the length up to 100 meters.

3. EXECUTION

3.1. Installation

A. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
B. Cable shall be installed following industry standard practices.
C. Horizontal cabling shall be installed from the work area outlet location to the nearest Telecommunications Space.

D. Horizontal cabling shall be terminated on a patch panel in the telecommunication space which is the same category rating as the Cable. i.e. CAT6 cable terminates on CAT6 panels.
E. Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
F. Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

END OF SECTION

3.1.7.2 27 15 43 Communications Faceplates and Connectors

3.1.7.2.1 27 15 43.10 Communications Copper Jack/Information Outlets and Connectors

1. GENERAL

1.1. Work Includes

Provide all labor, materials, and equipment for the complete installation of all Jack/Information outlets and connections called for in the Bid Documents.

1.2. Scope of Work

A. This section includes the minimum requirements for Jack/Information outlets and Connectors.
B. The channel performance for the installation shall meet or exceed the requirements of ANSI/TIA-568 and ISO/IEC 11801 for the specified Category.
C. The Jack/Information outlets shall match the category of the cabling
D. All jacks/information outlets shall meet UL 94 V-O

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.
B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
C. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
D. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/ICEA S-87-640, Standard for Optical Fiber Outside Plant Communications Cable
ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard
ANSI/TIA-569 Telecommunications Pathways and Spaces,
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
BICSI Telecommunications Distribution Methods Manual
Bellcore, fiber distributed data interface (FDDI) standards
J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 National Electric Code
Telcordia Generic Requirements for Optical Fiber and Optical Fiber Cable ISO/IEC 11801
CENELEC EN-50173

1.4. Submittals

Provide product data for the following:

Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5. Coordination

Coordinate installation of Jack/Information outlets and connectors with other trades.

2. PRODUCTS

2.1. General

A. All products will be compliant to RoHS 2002/95/EC
B. All products will be designed, manufactured and/or distributed under this quality management system: ISO 9001:2008
C. Telecommunications jacks shall be 8-position/8-conductor modular outlets accepting industry standard modular RJ45 type plugs and insulation displacement conductor (IDC) terminations.
D. The Universal design shall support T568B wiring and shall have universal wiring labels, including color-coded insert identification labels to ensure accurate identification.
E. Color shall be specified or selected by Owner's Representative from manufacturer's standard colors.
F. Provide crosstalk cancellation with compensation and alien crosstalk mitigation using printed wiring board materials and compensation technology.
G. Jack shall be backward compatible with lower category cords and cables.
H. Low-profile wire cap shall protect against contamination and secure connection. Jacks shall be suitable for:
    1. Modular patching applications or as modular TO
    2. Installation without special faceplates at either 45- or a 90-degree angle in manufacturer's modular faceplates and frames, including those on surface- mounted boxes
I. Dimensions
    1. Depth: 30.48 mm (1.20 in)
    2. Height: 20.32 mm (0.80 in)
    3. Width: 20.32 mm (0.80 in)
J. Electrical Specifications
    1. Contact Resistance Variation, maximum: 20 mOhm
    2. Contact Resistance, maximum: 100 mOhm
    3. Current Rating: 1.5 A @ 20 °C, 1.5 A @ 68 °F
    4. Dielectric Withstand Voltage, RMS, conductive surface: 1500 Vac @ 60 Hz
    5. Dielectric Withstand Voltage, RMS, contact-to-contact: 1000 Vac @ 60 Hz
    6. Insulation Resistance, minimum: 500 MOhm
K. Environmental Specifications
    1. Flammability Rating: UL 94 V-0
    2. Operating Temperature: -10 °C to +60 °C (+14 °F to +140 °F)
    3. Relative Humidity: Up to 95%, non-condensing
    4. Safety Standard: cUL, UL
    5. Storage Temperature: -40 °C to +70 °C (-40 °F to +158 °F)
L. Mechanical Specifications

1. Conductor Type: Solid, Stranded (7 strands)
2. Material Type: Copper alloy, High-impact, flame retardant, thermoplastic
3. Outlet/Module Contact Plating: Precious metals
4. Plug Insertion Life, minimum: 750 times
5. Plug Insertion Life, test plug: IEC 60603-7 compliant plug
6. Plug Retention Force, minimum: 30 lbf, 133 N
7. Rear Termination Contact Plating: Precious metals
8. Rear Termination Type: IDC
9. Wiring: T568B
10. Can be mounted either at 90 degrees (straight) or 45 degrees (angled)
11. Angled feature eliminates the need for special faceplates

2.2. Category 5 Enhanced (5e)/Class D Outlets

A. Pair splitters and wider channel for enhance conductor placement and termination
B. Optional Plastic Icons (M61A) and Dust Covers (M20A) available in several colors
C. Backward compatible with Category 5 and 3 cords
D. Refer to Appendix 2: CommScope Part Numbers
E. Approved Manufacturer:
    1. CommScope SYSTIMAX

Color	Single	
Blue	MPS100E-318	108232778
Yellow	MPS100E-123	108232711
Gray	MPS100E-270	108232752
White	MPS100E-262	108232745
Orange	MPS100E-112	108232703

Color	Single	
Green	MPS100E-226	108232729
Ivory	MPS100E-246	108232737
Violet	MPS100E-361	108337726
Red	MPS100E-317	108232760
Black	MPS100E-003	108232695

2.3. Category 6/Class E Outlets

A. GigaSPEED® XL MGS400 Series Category 6 U/UTP Information Outlet
B. Electrical performance guaranteed to meet or exceed TIA-568-C.2 Category 6 and ISO/IEC Category 6/Class E specifications.
C. Optional Plastic Icons (M61A) and Dust Covers (M20A) available in several colors
D. Backward compatible with Category 5e, 5 and 3 cords and cables, however optimal performance achieved when used with GigaSPEED XL GS8E patch cords.
E. Can support network line speeds in excess of 1 gigabit per second.
F. Qualifies for a 25-year product and applications assurance warranty when included as part of a certified SYSTIMAX GigaSPEED XL channel.
G. Universal design and shall support T568B wiring
H. Refer to Appendix 2: CommScope Part Numbers
I. Approved Manufacturer:
    1. CommScope SYSTIMAX

Color	Single	
Blue	MGS400-318	700206758
Yellow	MGS400-123	700206691
Gray	MGS400-270	700206733
White	MGS400-262	700206725
Orange	MGS400-112	700206683
Almond	MGS400-148	760074211

Color	Single	
Green	MGS400-226	700206709
Ivory	MGS400-246	700206717
Violet	MGS400-361	700206675
Red	MGS400-317	700206741
Black	MGS400-003	700206667
Cream	MGS400-215	760070326

2.4. Category 6 Augmented (6A)/Class EA Outlets

A. GigaSPEED® X10D MGS600 Series Information Outlet
B. Patented crossing of straddling pair contacts enables efficient alien crosstalk reduction in the channel.
C. Optional Plastic Icons (M61A) and Dust Covers (M20A) available in several colors.
D. Optimal performance is achieved when using the GigaSPEED X10D 360GS10E patch cords; however, the MGS600 is fully backwards compatible.
E. Can support network line speeds up to at least 10 gigabits per second.
F. Qualifies for the SYSTIMAX 25-Year Extended Product Warranty and Applications Assurance when included as part of a registered SYSTIMAX GigaSPEED X10D channel.
G. Refer to Appendix 2: CommScope Part Numbers
H. Approved Manufacturer:
    1. CommScope SYSTIMAX

Color	Single	
Blue	MGS600-318	760092452
Yellow	MGS600-123	760092387
Gray	MGS600-270	760092437
White	MGS600-262	760092429
Orange	MGS600-112	760092379

Almond	MGS600-148	760092478

Color	Single	
Green	MGS600-226	760092403
Ivory	MGS600-246	760092411
Violet	MGS600-361	760092460
Red	MGS600-317	760092445
Black	MGS600-003	760092361
Cream	MGS600-215	760092395

3. EXECUTION

3.1. Installation

A. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
B. Jack/Information outlets and Connectors shall be installed following industry standard practices.
C. Horizontal cabling shall be terminated on a Jack/Information outlet which is the same category rating as the Cable. i.e. CAT6 cable terminates on CAT6 Jack/Information outlets.
D. Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
E. Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

END of SECTION

3.1.7.2.2 27 15 43.25 Work Area Faceplate/Wall Plates and Surface Mount Boxes

1. GENERAL

1.1. Work Includes

Provide all labor, materials, and equipment for the complete installation of all Faceplate/wall plates and Surface mount Boxes called for in the Bid Documents.

1.2. Scope of Work

A. This section includes the minimum requirements for Faceplate/wall plates and Surface mount Boxes.
B. All Faceplates and Surface Mount boxes shall be constructed of high-impact, flame retardant; UL rated 94 V-0 Thermoplastic.
C. Faceplates and SMB shall be designed to accept the CommScope SYSTIMAX information outlets.
D. Number of outlets per faceplate shall be as detailed on the Telecommunications Drawings.

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.
B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
C. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
D. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard
ANSI/TIA-568-C.1 – Commercial Building Telecommunications Cabling Standard
ANSI/TIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
ANSI/TIA-568-C.3 – Optical Fiber Cabling Components Standard
ANSI/TIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
BICSI-Telecommunications Distribution Methods Manual
CENELEC EN-50173 - Generic Cabling Systems
ISO/IEC 11801 - Generic Cabling for Customer Premises
J-STD-607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code

1.4. Submittals

Provide product data for the following:

Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5. Coordination

Coordinate installation of Faceplate/wall plates and Surface mount Boxes with other trades.

2. PRODUCTS

2.1. Faceplates and Surface Mount Boxes (SMB)

A. Refer to Appendix 2: CommScope Part Numbers

B. Approved Manufacturer:

(Following Catalog Number/Part numbers are provided as examples, see CommScope representative for assistance in selecting the proper faceplates and SMBs)

Faceplate physical specifications

Product number	Port configuration	Port quantity	Port orientation	Box gang quantity	Available styles
Flush mounted modular faceplates—flat edge LE Series					
M10LE	simplex	1	NA	1	black
M12LE	duplex	2	horizontal	1	creme
M13LE	triplex	3	vertical	1	ivory
M14LE	quadplex	4	square	1	white
M16LE	sixplex	6	vertical	1	gray
Flush mounted modular faceplates—beveled edge L Series					
M10L	simplex	1	NA	1	black
M12L	duplex	2	horizontal	1	electrical ivory
M13L	triplex	3	vertical	1	electrical white
M14L	quadplex	4	square	1	electrical gray
M16L	sixplex	6	vertical	1	
M28L	eightplex	8	horizontal	2	
M10LW	(wall phone) simplex	1	NA	1	electrical ivory
M10LW	(wall phone) simplex	1	NA	1	electrical white
M12AP	duplex	2	vertical	1	electrical ivory
M12AP	duplex	2	vertical	1	electrical white
Flush mounted modular faceplates—flat edge M Series					
M13FP	single gang frame	NA	NA	1	black
M26FP	double gang frame	NA	NA	2	ivory
M30FP-1RJ45	single port adapter	1	NA	NA	white
M30FP-2RJ45	double port adapter	2	horizontal	NA	gray
M30FP-SVHS	flush mount S-VHS adapter	1	NA	NA	
M30FP-3RCA	3-port RCA adapter	3	horizontal	NA	
M30FP-VGA-PT	VGA adapter	1	NA	NA	
M30FP-BLANK	blank adapter	blank	NA	NA	
Flush mounted modular faceplates—stainless steel					
M12SP	duplex	2	horizontal	1	brushed stainless steel
M13SP	triplex	3	vertical	1	
M14SP	quadplex	4	square	1	
M16SP	sixplex	6	vertical	1	

Faceplate physical specifications

Product number	Port configuration	Port quantity	Port orientation	Box gang quantity	Available styles
Flush mounted multimedia faceplate base					
M10MMFP	base—optical fiber				black
M105FR1	simplex	1	NA	1	black
M106FR2	duplex	2	vertical	1	electrical ivory
M108FR3	triplex	3	vertical	1	electrical white
M106FR4	quadplex	4	square	1	electrical gray
Flush mounted outlet with protective hood					
M14MMO	quadplex	4	square	1	black electrical ivory electrical white electrical gray
Furniture faceplates—generic					
M62C	sixplex	6	horizontal	NA	electrical ivory
M4CA	quadplex	4	square	NA	black-white ivory-gray
Furniture faceplates—manufacturer standards					
M13	triplex (steelcase)	3	horizontal	NA	black electrical ivory/white/gray
M13CLS	triplex—optical fiber (steelcase)	3	horizontal	NA	ivory-white-gray black-misty creme
M13HM	triplex—optical fiber (Herman-Miller)	3	horizontal	NA	black-white ivory-gray
M14C	quadplex—knoll	4	horizontal	NA	black-gray-almond
M14CE	quadplex—steelcase	4	horizontal	NA	black-white
M14CH	quadplex—Herman-Miller	4	square	NA	ivory-gray
Mounting colars					
M30MC	simplex	1	NA	NA	black electrical ivory electrical white electrical gray
M30CC	simplex	1	MN	NA	ivory

2.2. Dust Covers for Faceplates

A. Dust Covers shall be dual purpose blank covers designed for use with modular outlets and faceplates. They shall be used to cover the outlet opening of all empty faceplate openings and unpopulated jacks to protect the wires from collecting dust.
B. Refer to Appendix 2: CommScope Part Numbers
C. Approved Manufacturer:
(Following Catalog Number/Part numbers are provided as examples, see CommScope representative for assistance in selecting the proper faceplates)
    1. CommScope

M20AP-246 107067860 Ivory cover for empty faceplate openings
M21A-246 108066457 Ivory cover for unpopulated jacks

2.3. 110 Wiring Blocks

A. General: Comply with following specifications for 110-style wiring blocks:
   1. Construction: Hardware shall be made of fire-retardant molded plastic and consist of horizontal index strips for terminating 25 pairs of conductors each. Index strips shall be marked with 5 colors on high teeth, separating tip and ring of each pair, to establish pair location. Series of fanning strips shall be located on each side of block for dressing able pairs terminated on adjacent index strips.

B. Approved product:

   SYSTIMAX Solutions 110 Wiring Blocks

   1. Performance: Hardware shall support category 5, category 5e, category 6, and category 6a applications and facilitate cross connection and interconnection using either cross connect wire (voice only) or appropriate category patch cords.
   2. Conductors: Accommodate 22 to 26 AWG conductors.
   3. Mounting: Mount directly on wall surfaces with or without backboard or 24-inch free-standing frame.
   4. Labeling: Clear label holders with appropriate colored inserts shall be provided with wiring blocks. Insert labels shall contain vertical lines spaced based on circuit size (3-, 4-, or 5-pair) and shall not interfere with running, tracing, or removing jumper wire/patch cords.
   5. Mechanical specifications: Hardware shall accommodate more than 500 repeated insertions without incurring permanent deformation
   6. Capacities: Wiring blocks shall be available in following pair quantity capacities:
      a. 25 pair: Available without legs only
      b. 50 pair: Available without legs only
      c. 100 pair: Available with or without legs
      d. 300 pair: Available with or without legs
   7. Accessories shall be provided where specified or indicated.

2.4. Labels and Holders

A. General:
   1. Labels and holders shall consist of clear label holder and colored label inserts, available in green, purple, yellow, blue, gray, brown, white, and orange as approved by Owner's Representative.
   2. Insert labels shall contain vertical lines spaced on basis of circuit size (i.e. 3-, 4-, or 5-pair).
   3. Transparent label holder shall snap onto wiring block to clearly identify wiring functions, provide circuit

B. Patch panels: Comply with following specifications for 110 patch panels:
   1. Construction: Patch panel system shall include 110-style wiring blocks with following components:
      a. SYSTIMAX Solutions 110D wiring blocks (100 pair)
      b. SYSTIMAX Solutions 110B1 jumper troughs mounted on metal back panel, designed to provide routing of incoming cables behind 110 blocks and troughs
      c. SYSTIMAX Solutions 110C connector blocks in 3-, 4-, or 5-pair modularity

d. Designation strips
e. White labels
f. Grounding hardware
Approved product:
SYSTIMAX Solutions 110 patch panels

3. *Mounting:*

3.1. Patch panel shall be wall mounted or rack mounted.

Comply with BAS application standards for related cabling.

A. **Accessories**: Provide accessories where specified or indicated as follows:
1. Patch panel system terminal blocks: Terminal block shall terminate connectorized or raw-ended cable pairs. Provide connecting blocks in 3-, 4-, or 5-pair sizes as along with transparent label holders and insertable circuit identification labels.
Approved product:
SYSTIMAX Solutions 110P patch panel system

B. **Connector system mounting brackets**: Provide bracket for mounting 110 connector system hardware on 483 millimeters (19 inches) wide frame rack or data cabinet. Provide on rear of brackets cable support rings to secure cable routed through openings in mounting bracket to wiring blocks. Route cross-connect wire or patch cords from wiring blocks through troughs to side of frame to facilitate wire management. Mounting brackets shall be mounted one on top of other to support pair quantity requirements. Comply with following specifications:
1. SYSTIMAX Solutions 110RD2-100-19 mounting brackets shall be used for mounting two 110DW1-25 or 110DW1-50 wiring blocks and two 110B3 troughs on EIA 310C 483 millimeters (19 inches) wide frame.
2. SYSTIMAX Solutions 110RD2-200-19 mounting bracket shall be used for mounting two 110DW2-100 wiring blocks and two 110B3 troughs on EIA 310C 483 millimeters (19 inches) wide frame.
3. SYSTIMAX Solutions 110RP2-600-19 mounting bracket with set of three 1-inch bars that attach to 19-inch frame shall be used to support two 110 pre-connectorized patch panels or patch panel and 188 backboard and connector bracket.

Approved product:
SYSTIMAX Solutions 110RD2 mounting brackets

C. **Patch panel system backboards**: Use metal panels equipped with distributing rings to provide vertical paths for running patch cords or jumpers between 110 patch panel system terminal blocks.
D. Backboards shall be constructed of metal and provide 2 closed, formed, plastic distribution rings. Backboard shall be used with 110A wiring blocks to arrange jumper wires running between columns of wiring blocks. The backboard shall be placed between fields, to provide horizontal trough for wires and space to change direction of jumpers. One backboard should be provided for each vertical column of 110A wiring blocks. Comply with following specifications:
1. SYSTIMAX Solutions 188B1 backboard shall be mounted flat to wall surface.

2. SYSTIMAX Solutions 188B2 backboard with mounting legs shall be used for routing cable behind backboard.

E. **110 jumper troughs**: White, flame retardant, molded, plastic frame shall accommodate patch cords or cross-connect wire.
   1. Troughs shall be placed between each 100-pair wiring block and at top of each column, where it shall serve as a horizontal trough for routing patch cords and cross-connect wire. Comply with following specifications:
      a. SYSTIMAX Solutions 569389-1 trough with legs shall be used with 110A wiring block.
      b. SYSTIMAX Solutions 569597-1 trough without legs shall be used with 110D wiring block or patch panel.
      c. SYSTIMAX Solutions 569597-1 distribution ring shall provide for routing of cross-connect wire or patch cords alongside wiring blocks.

F. **110 jack panel system**: System shall be used for termination and inter-connection of voice and/or data circuits in premises wiring systems/data circuits in premises wiring systems.

G. Connecting hardware apparatus product shall consist of 8-pin modular jacks, mounted in a metallic holder, and wired to standard 110 wiring block.

H. Jack panels shall include 110 IDC field and 8-pin modular jack through printed wiring board. Comply with following standards:

   TIA/EIA-568-C.1
   TIA/EIA-568-C.2
   ISO/IEC 11801
   CENELEC EN-50173
   UL, ULC, and ACMA

   Approved product:
   SYSTIMAX Solutions 110 jack panels

I. 110 patch cords and adapter cords:
   1. The product shall provide for administration and interconnection of data and voice circuits.
   2. Cords shall be manufactured with cordage product, consisting of 24 AWG tinned copper stranded conductors insulated with high-density polyethylene.
   3. Insulated conductors shall be tightly twisted into individual pairs and jacketed with flame retardant PVC.
   4. Comply with following physical specifications:
      a. Plastic material: Polycarbonate blend
      b. Flammability rating: UL-rated 94 V-0
      c. Contact material: Phosphor bronze
      d. Contact plating: Gold (Au)—0.051 to 0.128 micrometers (2 to 5 micro inches); nickel—1.91 micrometers (75 micro inches)
      e. Plug insertion life: 200 minimum
      f. Operating temperature: –10 to 60 degrees C (14 to 140 degrees F)
      g. Classification: UL and ULC CM (cordage) Approved

4. EXECUTION

4.1. Installation

A. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
B. Faceplate/wall plates and Surface mount Boxes shall be installed following industry standard practices.
C. Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
D. Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

END of SECTION

3.1.8 27 16 00 Communications Connecting Cords, Devices and Adapters

3.1.8.1 27 16 19 Communications Patch Cords, Station Cords, and Cross Connect Wire

3.1.8.1.1 27 16 19.02 Copper Patch Cords

1. GENERAL

1.1. Work Includes

Provide all labor, materials, and equipment for the complete installation of all Copper Patch cords into the approved patch panels called for in the Bid Documents.

1.2. Scope of Work

A. This section includes the minimum requirements for Copper Patch Cords.
B. All Patch/Equipment Cords shall be new.
C. On new installations, Patch/Equipment Cords shall be made by the same manufacturer as the Horizontal Cable used in the new installation.
D. Patch/Equipment Cords shall be available in multiple colors. Colors required are to be detailed in the Bid Documents.
E. All Patch/Equipment Cords shall be factory manufactured and tested for compliance to the appropriate standards and performance.
F. Patch/Equipment Cord length shall be determined by the end user.
G. Patch/Equipment Cords shall be installed using proper cable management.
H. Minimum bend radius shall not be exceeded.

1.3. Quality Assurance

A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.
B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
C. Strictly adhere to all Building Industry Consulting Service International (BICSI) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
D. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:

ANSI/ICEA S-87-640, Standard for Optical Fiber Outside Plant Communications Cable
ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard
ANSI/TIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces
ANSI/TIA-606 Administration Standard for the Telecommunications Infrastructure
BICSI – Telecommunications Distribution Methods Manual

J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code
Telcordia, GR-20-CORE, Generic Requirements for Optical Fiber and Optical Fiber Cable

1.4. Submittals

Provide product data for the following:

Manufacturers cut sheets, specifications and installation instructions for all products (submit with bid).

1.5. Coordination

Coordinate layout and installation of Patch/Equipment Cords with other trades.

2. PRODUCTS

2.1. Category 6 /Class E Patch Cords

A. The Modular Patch Cords shall meet or exceed TIA ANSI/TIA-568-C.2 Category 6 and ISO/EIC Category 6/Class E specifications and shall be fully backward compatible with Category 5e and 5 connectors.
B. Refer to Appendix 2: CommScope Part Numbers
    1. Approved Manufacturer:
    (The following Catalog/Part numbers are shown as examples, contact your CommScope Representative to specify correct Catalog/Part numbers)
        a. CommScope Portfolio Reduced Diameter Patch Cords

Color	Product #	Material ID
Blue	MINO6-BL	CO166S2-0ZFxxx
White	MINO6-WH	CO166S2-08Fxxx
Yellow	MINO6-YL	CO166S2-09Fxxx
Dark Gray	MINO6-DG	CO166S2-03Fxxx
Spring Green	MINO6-SG	CO166S2-04Fxxx

Color	Product #	Material ID
Orange	MINO6-OR	CO166S2-06xxx
Purple	MINO6-PR	CO166S2-0Lxxx
Red	MINO6-RD	CO166S2-07xxx
Black	MINO6-BK	CO166S2-01xxx
Light Blue	MINO6-LB	CO166S2-02xxx

b.CommScope SYSTIMAX Standard Patch Cords

Color	Product #	Material ID
Blue	GS8E-BL	CPC3312-0ZFyyy
White	GS8E-WH	CPC3312-08Fyyy
Yellow	GS8E-YL	CPC3312-09Fyyy
Dk. Gray	GS8E-DG	CPC3312-03Fyyy
Green	GS8E-GN	CPC3312-04Fyyy

Color	Product #	Material ID
Orange	GS8E-OR	CPC3312-06Fyyy
Lilac	GS8E-LL	CPC3312-0BFyyy
Red	GS8E-RD	CPC3312-07Fyyy
Black	GS8E-BK	CPC3312-01Fyyy
Lt. Blue	GS8E-LB	CPC3312-02Fyyy

c. CommScope Ceiling Connector Assembly (CCA) for UTP MPTL Links

Material ID	Product Number	Environmental Space
760235585	CCA-GS8E-LSZH-BLACK-N018	LSZH
760235586	CCA-GS8E-LSZH-WHITE-N018	LSZH
760235587	CCA-GS8E-PLENUM-BLACK-N018	Plenum
760235588	CCA-GS8E-PLENUM-WHITE-N018	Plenum
760234921	Ceiling Connector Assembly (CCA) without cordage	Plenum/LSZH

2.2. Category 6 Augmented (6A)/Class EA Patch Cords

A. The Modular Patch Cords shall meet or exceed the channel specifications of Amendment 1 to ISO/IEC 11 801:2002 Class EA and ANSI/TIA-568-C.2 Category 6A up to 500 MHz when used as part of a UTP Channel.

B. Refer to Appendix 2: CommScope Part Numbers

1. Approved Manufacturer:
   (The following Catalog/Part numbers are shown as examples, contact your CommScope Representative to specify correct Catalog/Part numbers)

a. CommScope Portfolio Reduced Diameter Patch Cords

Color	Product #	Material ID
Blue	MiNo6A-BL	CO199K2-0ZFyyy
White	MiNo6A-WH	CO199K2-08Fyyy
Yellow	MiNo6A-YL	CO199K2-09Fyyy
Dark Gray	MiNo6A-DG	CO199K2-03Fyyy
Spring Green	MiNo6A-SG	CO199K2-04Fyyy

Color	Product #	Material ID
Orange	N/A	N/A
Purple	MiNo6A-VL	CO199K2-0LFyyy
Red	MiNo6A-RD	CO199K2-07Fyyy
Black	MiNo6A-BK	CO199K2-01Fyyy
Light Blue	MiNo6A-LB	CO199K2-02Fyyy

b. CommScope SYSTIMAX Standard Patch Cords

Color	Product #	Material ID
Blue	360GS10E-BL	CPCSSX2-0ZFyyy
White	360GS10E-WH	CPCSSX2-08Fyyy
Yellow	360GS10E-YL	CPCSSX2-09Fyyy
Dk. Gray	360GS10E-DG	CPCSSX2-03Fyyy
Green	360GS10E-GN	CPCSSX2-04Fyyy
Slate	360GS10E-SL	CPCSSX2-0CFyyy
Color	Product #	Material ID
Orange	360GS10E-OR	CPCSSX2-06Fyyy
Lilac	360GS10E-LL	CPCSSX2-0BFyyy

Red	360GS10E-RD	CPCSSX2-07Fyyy
Black	360GS10E-BK	CPCSSX2-01Fyyy
Lt. Blue	360GS10E-LB	CPCSSX2-02Fyyy

c. CommScope Ceiling Connector Assembly (CCA) for UTP MPTL Links

Material ID	Product Number	Environmental Space
760235589	CCA-GS10E-LSZH-BLACK-N018	LSZH
760235590	CCA-GS10E-LSZH-WHITE-N018	LSZH
760235591	CCA-GS10E-PLENUM-BLACK-N018	Plenum
760235592	CCA-GS10E-PLENUM-WHITE-N018	Plenum
760234921	Ceiling Connector Assembly (CCA) without cordage	Plenum/LSZH

3. EXECUTION

3.1. Installation

A. Copper Jumpers/patch cables

1. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
1. Cable shall be installed following industry standard practices.
2. Contractor shall not exceed the maximum pulling tension or the minimum bending radius for copper cables per manufacturer's specifications.
3. All installations shall comply with:

ANSI/TIA-568 Series Commercial Building Telecommunications Cabling Standard,
ANSI/TIA-569 Commercial Building Standard for Telecommunications Pathways and Spaces
ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
BICSI – Telecommunications Distribution Methods Manual
J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
NFPA 70 – National Electric Code

END of SECTION

COMMSCOPE MASTERFORMAT

The intent of this document is to provide customers with assistance in completing the Construction Specifications Institute (CSI) MasterFormat™ template for a CommScope telecommunication cabling system. This document provides the minimum performance criteria for the components and sub-systems comprising a complete cabling system. When the complete telecommunication cabling system is installed by an authorized contractor in accordance with the manufacturer's instructions, the cabling system shall be warranted per the CommScope system performance and component warranties.

Product part numbers, general design considerations, and installation guidelines are provided in this document. This document provides pertinent information to allow the contractor to bid the labor, supervision, tooling, and miscellaneous mounting hardware and consumables to install a complete system. It is the responsibility of the contractor to propose any and all items required for a complete system if not identified in this specification. This document is for planning purposes only and is not intended to modify or supplement any specifications or warranties relating to CommScope products or services.

END of SECTION

3.2 CORNING

3.2.1 27 13 23.01 General Requirements

A. All fiber optic cable, connectors, adapter panels, hardware, and fiber optic pre-terminated systems shall be of the same manufacturer to ensure network system compatibility, optimum performance, fit, function, appearance and warranty. The optical fiber infrastructure shall utilize Corning Cable Systems cabling and connectivity as specified here-in.

3.2.2 3 23.05 Optical Fiber

A. General Specifications
   1. All fiber shall be manufactured using the Outside Vapor Deposition (OVD) process to ensure bandwidth consistency.

B. Design Specification: The fiber type utilized in the cabling infrastructure shall be a Corning product that is specific to the application. Specific requirements for use of OM3, OM4 or OS2 shall be defined in project scope.

C. **Multimode Fiber** shall meet the specifications and standards listed in Table 1,
   1. Manufacturer shall use minEMBc bandwidth measurement methods to ensure multimode fiber performance
   2. 50um multimode fibers shall be bend-insensitive.

Table 1: Fiber Geometry, Optical Performance and Standards Compliance

	OM1	OM2	OM3	OM4
Core Diameter	62.5 ± 2.5 µm	50.0 ± 2.5 µm	50.0 ± 2.5 µm	50.0 ± 2.5 µm
Core Non-Circularity	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %
Cladding Diameter	125.0 ± 2.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm	125.0 ± 1.0 µm
Cladding Non Circularity	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %	≤ 1.0 %
Core-to-Cladding Concentricity	≤ 1.5 µm	≤ 1.5 µm	≤ 1.5 µm	≤ 1.5 µm
Coating Diameter	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm	242 ± 5 µm
Point discontinuity (850 nm, 1300 nm)	≤ 0.2 dB	≤ 0.2 dB	≤ 0.2 dB	≤ 0.2 dB
Cabled Effective Modal Bandwidth[1)] (MHz•km), 850 nm	≥ 220	≥ 950	≥ 2000	≥ 4700
OFL Bandwidth (MHz•km)				
850 nm	≥ 200	≥ 700	≥ 1500	≥ 3500
1300 nm	≥ 500	≥ 500	≥ 500	≥ 500
Numerical Aperture	0.275 ± 0.015	0.200 ± 0.015	0.200 ± 0.015	0.200 ± 0.015
Standards Compliance	IEC 60793-2-10 A1b TIA/EIA 492 AAAA-A ISO/IEC 11801 type OM1	IEC 60793-2-10 A1a.1 ITU-T G.651.1 TIA/EIA 492 AAAB-A ISO/IEC 11801 type OM2	IEC 60793-2-10 A1a.2 ITU-T G.651.1 TIA/EIA 492 AAAC-B ISO/IEC 11801 type OM3	IEC 60793-2-10 A1a.3 ITU-T G.651.1 TIA/EIA 492 AAAD ISO/IEC 11801 type OM4

D. All cabling and connectivity products shall use bend insensitive 50 um fiber that meets the performance requirements listed in Table 2.

Table 2: Bend Optimized Bend Performance and Thermal Performance

Attribute	Spec	Mean	Std. Dev.	Max
Macrobending Loss (turns x diameter)				
100×75 mm, 850 nm	≤ 0.05 dB	0.02	0.007	0.03
100×75 mm, 1300 nm	≤ 0.15 dB	0.08	0.008	0.08
2×30 mm, 850 nm	≤ 0.1 dB	0.02	0.013	0.05
2×30 mm, 1300 nm	≤ 0.3 dB	0.09	0.025	0.14
2×15 mm, 850 nm	≤ 0.2 dB	0.08	0.015	0.11
2×15 mm, 1300 nm	≤ 0.5 dB	0.27	0.048	0.39
Temperature Dependence				
850 nm	≤ 0.10 dB/km	0.02	0.006	0.03
1300 nm	≤ 0.10 dB/km	0.01	0.007	0.02
Temperature Humidity Cycle				
850 nm	≤ 0.10 dB/km	0.02	0.011	0.03
1300 nm	≤ 0.10 dB/km	0.03	0.017	0.05
Dry Heat Soak				
850 nm	≤ 0.20 dB/km	0.02	0.010	0.03
1300 nm	≤ 0.20 dB/km	0.01	0.005	0.02
Water Immersion				
850 nm	≤ 0.20 dB/km	0.01	0.013	0.04
1300 nm	≤ 0.20 dB/km	0.01	0.016	0.04
Damp Heat				
850 nm	≤ 0.20 dB/km	0.02	0.014	0.03
1300 nm	≤ 0.20 dB/km	0.02	0.017	0.05

E. **Single-mode** fiber shall meet the specifications listed in Table 3

F. Single-mode fiber shall meet ITU G.652 (Table D), ITU G.657 (Table A1), IEC Specification 60793-2-50 Type B1.3

Table 3: Single-mode OS2 Fiber Geometry and Optical Performance

		OS2
Cladding Diameter (μm)		125.0 ± 0.7
Core-to-Cladding Concentricity (μm)		≤ 0.5
Cladding Non-Circularity (%)		≤ 0.7
Mode Field Diameter (μm)		
	1310 nm	8.6 + 0.4
	1550 nm	9.8 ± 0.5
Coating Diameter (μm)		242 ± 5
Fiber Curl radius of curvature (m)		> 4.0
Point discontinuity (dB)		
	1310 nm	≤ 0.05
	1550 nm	≤ 0.05
Macrobend Attenuation (dB)		
Mandrel OD	Turns	
20 mm	1	< 0.50 at 1550 nm
20 mm	1	< 1.5 at 1625 nm
30 mm	10	< 0.05 at 1550 nm
30 mm	10	< 0.30 at 1625 nm
60 mm	100	< 0.01 at 1625 nm
Cable Cutoff Wavelength (nm)		< 1260
Zero Dispersion Wavelength (nm)		$1304 \leq \lambda o \leq 1324$
Zero Dispersion Slope (So) (ps/(nm²•km))		≤ 0.089
Total Dispersion (ps/(nm•km))		
	1550 nm	≤ 18
	1625 nm	≤ 22
Cabled Polarization Mode Dispersion ($ps/\sqrt{km}$		
	PMD Link Design Value	< 0.06
	Max Individual Fiber	< 0.1

3.2.3 Buffered Optical Fiber Cables for Horizontal Distribution

A. General:

1. Cable shall meet the requirements of the National Electrical Code (NEC) Section 770:
   a. Non-Plenum Applications: Applicable Flame Tests: ANSI/UL 1666. Cables shall be listed OFNR.
   b. Finished cables shall be tested to the applicable performance requirements of the Insulated Cable Engineers Association, Inc. (ICEA) Standard for Fiber Optic Premises Distribution Cable (ICEA S-83-596).
2. Cable shall be all-dielectric.

B. Fiber Specifications:

1. Detailed information on the cabled performance of the fiber types available for this cable design shall be found in the following manufacturers specifications:

a. Dispersion Un-shifted Single-mode Fiber: Corning Generic Specification F3, "Generic Specification for Single-mode Optical Fiber in Tight Buffer Cables."
b. 50/125 µm and 62.5/125 µm Multimode Fiber: Corning Generic Specification F4, "Generic Specification for Multimode Optical Fiber in Tight Buffer Cables."

C. Cable Construction:
   1. All fibers, except white, shall be colored with ultraviolet (UV) curable inks. Fibers occupying the white position shall be left uncolored.
   2. All fibers shall be coated with a low friction slip layer.
   3. Coated fibers shall be buffered with a thermoplastic compound to a diameter of 900 ± 50 SYMBOL 109 "Symbol" 10m.
   4. Individual fiber's 900 µ m buffer coating shall be color coded for identification. Color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding." Coloring material shall not be susceptible to migration and shall not affect the transmission characteristics of the optical fibers. Color-coded buffered fibers shall not adhere to one another. Buffered mechanical fibers in filler subunits, where used, shall be white (natural).
   5. When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used. Numbers shall be repeated at regular intervals.
   6. Fiber coating and buffer shall be removable with commercially available stripping tools in a single pass for connectorization or splicing.

D. Cable Core Construction: Strength members shall consist of high modulus strength yarns. Strength yarns shall be helically stranded around the buffered fibers. Non-toxic, non-irritant talc shall be applied to the yarns to allow them to be easily separated from the fibers and the jacket.
   1. Non-unitized Cables, 2 to 24 Fibers: Fiber shall be stranded around a dielectric strength element and surrounded by layered strength yarns. Strength element shall be overcoated with a thermoplastic, when required, to achieve dimensional sizing to accommodate and support the 900 µm buffered fibers. Cables having 12 to 24 fibers shall be dual layered. Strength yarns shall serve as the tensile strength members of the cable. A ripcord may be applied between the strength yarns and the outer jacket to facilitate jacket removal. An outer jacket shall be extruded over the strength yarns for physical and environmental protection.
   2. Unitized Cables, 24 to 72 Fibers: Buffered fibers shall be grouped in six fiber subunits. In each subunit, individual fibers shall be stranded around a dielectric strength element and surrounded by layered strength yarns. A ripcord shall be incorporated in the subunit design to facilitate access to the individual fibers. Subunit jacket shall be extruded over the strength yarns for additional physical and environmental protection. Subunits shall be stranded around a dielectric central member. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. An outer jacket shall be extruded around the subunits.
   3. Unitized Cables, 72 to 144 Fibers: Buffered fibers shall be grouped in twelve fiber subunits. In each subunit, the individual fibers shall be stranded around a dielectric strength element and surrounded by layered strength yarns. A ripcord shall be incorporated in the subunit design to facilitate access to the individual fibers. Subunit jacket shall be extruded over the strength yarns for additional physical and environmental protection. Subunits may be stranded around a dielectric central member. Cables may contain filler subunits to provide symmetry to the cable

design. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. An outer jacket shall be extruded around the subunits.

E. Cable Jacket:
   1. Jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. Jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. Jacket shall be smooth, as is consistent with the best commercial practice. Jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.
   2. Nominal thickness of the cable outer jacket shall be sufficient to provide adequate cable protection while meeting the mechanical, flammability, and environmental test requirements of this document over the life of the cable.
   3. Cable jacket and subunit jacket color shall be orange for cables/subunits containing multimode fiber except for cables/subunits containing 50/125 µm Laser Optimized Fiber, which shall have an aqua colored jacket. Cable/subunit jacket color shall be yellow for cables containing single-mode fiber.
   4. Outer cable jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet (e.g., "CORNING OPTICAL CABLE - MM/YY - 12 SME - EOS - OFNR FT4 c(ETL)us 00001 FEET"). Marking shall be in contrasting color to the cable jacket.

F. Cable Performance:
   1. Temperature Range:
      a. Storage temperature range for cable on the original shipping reel shall be -40 degrees C to +70 degrees C.
      b. Installation temperature range for riser cables shall be -10 degrees C to +60 degrees C.
      c. Operational temperature range for riser cables shall be -20 degrees C to +70 degrees C. Testing shall be in accordance with FOTP-3.
   2. Crush Resistance:
      a. When tested in accordance with FOTP-41, "Compressive Loading Resistance of Fiber Optic Cables," cable shall withstand a minimum compressive load of 100 N/cm (57 lbf/in) applied uniformly over the length of the compression plate.
      b. While under compressive load, the fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).
   3. Cyclic Flexing:
      a. When tested in accordance with FOTP 104, "Fiber Optic Cable Cyclic Flexing Test," the cable shall withstand 25 mechanical flexing cycles at a rate of 30 ± 1 cycle per minute.
      b. Fiber shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single mode) or greater than 0.60 dB at 1300 nm (multimode). J
      c. Jacket shall not crack, split, or tear.
   4. High and Low Temperature Bend:
      a. When tested in accordance with FOTP-37, "Fiber Optic Cable Bend Test, Low and High Temperature," cable shall withstand four full turns around a mandrel at an installation

temperature of -10 degrees C and +60 degrees C. Mandrel diameter shall be the greater of 20 times the cable OD or 150 mm.

b. Fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single mode) or greater than 0.60 dB at 1300 nm (multimode).

5. Impact Resistance:
   a. When tested in accordance with FOTP-25, "Repeated Impact Testing of Fiber Optic Cables and Cable Assemblies," cable shall withstand a minimum of 2 impact cycles at 3 locations spaced a minimum distance of 150 mm. Impact energy shall be 2.94 Nm.
   b. Fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single mode) or greater than 0.60 dB at 1300 nm (multimode).
   c. Jacket shall not crack, split or tear.
6. Temperature Cycling:
   a. When tested in accordance with FOTP-3, "Procedure to Measure Temperature Cycling Effects on Optical Fiber, Optical Cable, and Other Passive Fiber Optic Components," the change in attenuation after the second cycle at extreme operational temperatures (-20 degrees C and +70 degrees C) shall not exceed 0.40 dB/km at 1550 nm (single-mode) or 0.60 dB/km at 1300 nm (multimode). Change in attenuation is measured with respect to the baseline values measured at room temperature before temperature cycling.
7. Twist-Bend:
   a. When tested in accordance with FOTP-85, "Fiber Optic Cable Twist Test," a length of cable no greater than 2 meters shall withstand 10 cycles of mechanical twisting and bending.
   b. Fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or 0.60 dB at 1300 nm (multimode).
8. Tensile and Fiber Strain:
   a. When tested in accordance with FOTP-33, "Fiber Optic Cable Tensile Loading and Bending Test," and FOTP-38, "Measurement of Fiber Strain in Cables Under Tensile Load," a length of cable shall be tested to the rated tensile load.
   b. For cables < 12f the rated tensile load is 660 N (148 lbf) and for cables > 12f the rated tensile load is 1320 N (297 lbf).
   c. While under rated tensile load, fiber shall not experience a measured fiber strain greater than 60% of the fiber proof test level. After being held at the residual load (30% of the rated tensile load), the fiber shall not experience a measured fiber strain greater than 20% of the fiber proof test level nor an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).
   d. After the tensile load is removed, fibers shall not experience an attenuation change greater than 0.40 dB at 1550 nm (single-mode) or greater than 0.60 dB at 1300 nm (multimode).

3.2.3.1 EXECUTION

1. EXAMINATION

A. Do not begin installation until support structures and substrates have been properly prepared.

B. Verify installation of the fiber optic cable backbone cabling Specified is **Section 27 13 23**.

C. Verify installation of support structures for horizontal fiber optic cable before the installation.
D. Do not install a fiber optic cable in a conduit or duct that already contains cabling, regardless of the cable type.
E. Remove abandoned cables unless unused cables are reserved for future use or cable that is not terminated at equipment other than a connector and not identified for future use with a tag as required by the National Electrical Code.
F. If support structures and substrate preparation are the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

2. *INSTALLATION*

A. General: Cable manufacturer shall provide installation procedures and technical support concerning the items contained in this specification.
B. Testing and Acceptance:
    1. All cables shall be tested according to the requirements of ANSI/TIA 568.3-D. Any defects in the cabling, connectors, couplers or patch panels shall be repaired or replaced in order to ensure 100% useable fiber in all cables installed.
    2. For horizontal cabling system using multimode optical fiber, attenuation shall be measured in one direction at either 850 nanometer (nm) or 1300 nm using an LED light source and power meter using an encircled flux (EF) compliant reference jumper per ANSI/TIA-526-14-C.
    3. If performing Tier II testing with an OTDR, fiber cabling shall be tested at both 850 nm and 1300 nm for Multimode or 1310 nm and 1550 nm for single-mode. This should be a bi-directional test that averages the values to compensate for any mode field mismatch.

3. *PROTECTION*

A. Protect installed products until completion of project.
B. Touch-up, repair or replace damaged products before Substantial Completion.

4. *SCHEDULES*

A. Tight-Buffered:
    1. MIC Tight Buffered, Plenum; Corning Generic Spec PGS049
    2. MIC Tight Buffered, Interlocking Armored, Plenum; Corning Generic Spec PGS049
    3. MIC Unitized Tight Buffered, Plenum; Corning Generic Spec PGS049
    4. MIC Unitized Tight Buffered, Interlocking Armored, Plenum; Corning Generic Spec PGS049
    5. Reel-In-A-Box, MIC Tight Buffered, Plenum; Corning Generic Spec PGS049
    6. MIC DX Tight Buffered Armored, Plenum; Corning Generic Spec PGS091
B. Ribbon:
    1. Ribbon, Plenum; Corning Generic Spec PGS043
    2. Ribbon, Interlocking Armored, Plenum; Corning Generic Spec PGS043
    3. Ruggedized Ribbon, Plenum; Corning Generic Spec PGS043
    4. UltraRibbon Indoor, Gel-Free, Plenum; Corning Generic Spec PGS043
    5. LSZH Ribbon; Corning Generic Spec PGS056
    6. LSZH UltraRibbon Indoor Gel-Filled; Corning Generic Spec PGS056

7. LSZH UltraRibbon Indoor Gel-Free; Corning Generic Spec PGS056
8. Fan-out, Tight Buffered, Plenum; Corning Generic Spec PGS017

C. Loose Tube:
1. Mining and Petrochemical Tray-Rated, Loose Tube, Gel-Free; Corning Generic Spec PGS116

D. Hybrid:
1. Class 3 Limited Power Cables for Indoor Plenum; Corning Generic Spec PGS130
2. Class 3 Limited Power Cables for Interlocking Armored Cables for Indoor Plenum; Corning Generic Spec PGS130
3. Class 3 Limited Power Cables for Indoor/Outdoor, FREEDM Riser; Corning Generic Spec PGS130
4. Class 3 Limited Power Cables Tight-Buffered, Indoor, Plenum; Corning Generic Spec PGS130
5. Class 3 Limited Power Interlocking Armored Cables, FREEDM, Riser, Corning Generic Spec PGS130

3.2.4 27 13 23.10 Indoor Fiber Optic Cable

E. General Specifications
1. The cable shall meet all requirements stated in this specification.
2. Non-Plenum Applications Applicable Flame Tests: UL 1666. Cables shall be listed OFNR (OFCR).
3. Plenum Applications Applicable Flame Test: NFPA 262. Cables shall be listed OFNP (OFCP).
4. Finished cables shall conform to the applicable performance of the Insulated Cable Engineers Association, Inc. (ICEA) Standard for Fiber Optic Premises Distribution Cable (ICEA S-83-596).
5. Reference Division 27 13 23.25

F. Design Specifications: Indoor (riser or plenum) applications shall utilize Corning Cable Systems indoor tight-buffered cables and/or ribbon cables
1. MIC Riser and Plenum (all-dielectric and with interlocking armor)
2. MIC DX Riser and Plenum (all-dielectric armor)
3. Ribbon Riser and Plenum (all dielectric and with interlocking armor)

G. Tight-Buffered Cable (all-dielectric, with interlocking armor, and with all-dielectric armor)
1. Cable Construction
a. The coated fiber shall have a low friction slip layer placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be 900 ± 50 □m.
b. Cables with 2 to 24 Fibers
1. Layered strength yarns shall serve as the tensile strength member of the cable.
2. A ripcord may be applied between the strength yarns and the outer jacket to facilitate jacket removal.
3. The outer jacket shall be extruded over the strength yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
c. Cables with 24-144 Fibers: Unitized Riser and Plenum Constructions

1. For fiber counts of 24-54, the buffered fibers shall be grouped in 6-fiber subunits; the fibers shall be stranded around a dielectric strength yarn in the subunit.
2. For fiber counts of 60-144, the buffered fibers shall be grouped in 12-fiber subunits; the fibers shall be stranded around a dielectric strength yarn in the subunit and shall be arranged in two layers.
3. Layered strength yarns shall serve as the tensile strength member of the subunit.
4. A ripcord may be applied between the strength yarns and the subunit jacket to facilitate jacket removal.
5. The subunit jacket shall be extruded over the strength yarns for physical and environmental protection. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice.
6. The subunits shall be stranded around a dielectric central member. Cables may contain filler subunits to provide symmetry to the cable design. A ripcord shall be inserted beneath the outer jacket to facilitate jacket removal. The outer jacket shall be extruded around the subunits.

d. Outer Cable Jacket:

1. The cable jacket color shall be aqua for cables containing OM3 or OM4 fiber, and yellow for cables containing single mode fiber. For cables with sub-units, the sub-unit jacket color shall follow the same color guidance.
2. The indoor tight-buffered distribution cable shall also be available with aluminum interlocking armor. An additional outer jacket shall be placed over the interlocking armor. The color of the armor jacket shall match the jacket color of the optical fiber cable located inside of the armor. Cables with interlocking armor shall be available in fiber counts up to 144 fibers.
3. The indoor tight-buffered distribution cable shall also be available with a polyvinyl chloride (PVC) all dielectric armor. The armor material shall be dielectric (no metal/non-conductive). The cable shall not require bonding or grounding during installation or splicing. An additional outer jacket shall be placed over the dielectric armor. The color of the armor jacket shall match the jacket color of the optical fiber cable located inside of the armor. Cables with all-dielectric armor shall be available in fiber counts of 6, 12 and 24 fibers.

2. Identification

a. The individual fibers shall be color coded for identification. The optical fiber color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding."
b. When buffered fibers are grouped into individual subunits, each subunit jacket shall be numbered for identification, with the exception of filler subunits where used.
c. The outer jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, shop order number, optional SOC code (SR##########), fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet.

H. Single Tube Ribbon Cable (all-dielectric, and with interlocking armor)

1. Ribbon Construction
    a. All ribbons in the cable shall be usable and meet required specifications
    b. Individual fiber ribbons shall contain 12 usable fibers.
    c. The fiber ribbon dimensions shall be measured in accordance with FOTP-123, "Measurement of Optical Fiber Ribbon Dimensions."
    d. All fibers in the ribbon shall be parallel with no cross over along the entire length of the cable.
    e. The fibers shall be colored with ultraviolet (UV) curable inks.
    f. Each fiber within a 12-fiber ribbon shall be distinguishable by means of color coding in accordance with TIA/EIA-598, "Optical Fiber Cable Color Coding." The coloring material shall be stable over the temperature range of the cable, shall not be susceptible to migration, and shall not affect the transmission characteristics of the optical fibers.
    g. The ribbon matrix material shall be removable with industry standard peel-able methods or commercially available heat strippers.
2. Cable Construction
    a. Optical fibers shall be placed inside a central buffer tube.
    b. The central tube shall contain up to eighteen ribbons for fiber counts from 12 to 216 fibers.
    c. The fiber ribbons shall not adhere to the inside of the buffer tube.
    d. The central tube shall be resistant to external forces.
    e. The central tube shall be dry and not filled with gel.
    f. Dielectric strength elements shall be helically applied over the cable core covered with a second layer of dielectric strength elements helically applied in the opposite direction to provide longitudinal tensile strength and anti-buckling.
    g. Cables shall contain two ripcords beneath the outer jacket for easy sheath removal.
    h. Cable Outer Jacket
        1. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.
        2. The cable jacket color shall be aqua for cables containing OM3 or OM4 fiber, and yellow for cables containing single mode fiber.
        3. The indoor plenum ribbon distribution cable shall also be available with aluminum interlocking armor. The interlocking armor for the plenum cables shall have a PVC jacket. The color of the armor jacket shall match the jacket color of the optical fiber cable located inside of the armor. Cables with interlocking armor shall be available in fiber counts from 12 to 216 fibers.
3. Identification
    a. The individual fibers shall be color coded for identification. The optical fiber color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding."
    b. The outer jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, fiber count, fiber type, flame rating, listing symbol, telecommunication handset symbol, and sequential length markings every two feet.

3.2.5 27 13 23.15 Indoor/Outdoor Cable

A. General Specifications
   1. The cable shall meet all requirements stated in this specification.
   2. Non-Plenum Applications - Applicable Flame Tests: UL 1666. Cables shall be listed OFNR (OFCR).
   3. Plenum Applications - Applicable Flame Test: NFPA 262. Cables shall be listed OFNP (OFCP).
   4. Finished cables shall conform to the applicable performance of the Insulated Cable Engineers Association, Inc. (ICEA) Standard for Standard For Indoor-Outdoor Optical Cable (ICEA S-104-696).

B. Loose Tube Indoor/Outdoor Fiber Optic Cable (all-dielectric riser 2-288F, all-dielectric plenum 2-72F, and riser with interlocking armor 2-288F)
   1. Cable Construction
      a. Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 2.5 mm.
      b. Each buffer tube shall contain up to 12 fibers
      c. The fibers shall not adhere to the inside of the buffer tube or to each other.
      d. Each buffer tube shall contain a water blocking element for water-blocking protection. The water swellable element shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter. This element will preclude the need for other water-blocking material; the buffer tubes shall be gel-free.
      e. The optical fibers shall not require cleaning before placement into a splice tray or fan-out kit.
      f. The buffer tubes shall be resistant to kinking.
      g. Filler rods may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 2.5 mm in outer diameter.
      h. The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod. The purpose of the central member is to provide tensile strength and prevent buckling of the cable. The GRP rod shall be overcoated with a thermoplastic, when required to achieve dimensional sizing to accommodate buffer tubes/fillers.
      i. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process. Water blocking yarn(s) shall be applied longitudinally along the central member during stranding.
      j. Two polyester yarn binders shall be applied contrahelically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dielectric with low shrinkage.
      k. For single layer cables, a water blocking tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The tape shall be held in place by a single polyester binder yarn. The water blocking tape shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter.

l. For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two-layer core. A water blocking tape shall be applied longitudinally over both the inner and outer layers with each being held in place with a single polyester binder yarn. The water blocking tape shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter.

m. The cable shall contain at least one ripcord under the sheath for easy sheath removal.

n. A flame-retardant tape may be applied to provide additional resistance to flame propagation for higher fiber count cables.

o. Outer Cable Jacket

1. Cables shall be sheathed with flame-retardant polyvinyl chloride (PVC). Jacketing material shall be applied directly over the tensile strength members and water blocking tape. The PVC shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.
2. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; jackets extruded under high pressure are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service.
3. The riser rated cables shall be available with an optional aluminum interlocking armor. The interlocking armor shall be covered with a flame-retardant PVC outer jacket. Cables with interlocking armor shall be available in fiber counts up to 288 fibers.

2. Identification

a. Each fiber shall be distinguishable by means of color-coding accordance with TIA/EIA-598, "Optical Fiber Cable Color Code." The fibers shall be colored with ultraviolet (UV) curable inks.

b. Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598, "Optical Fiber Cable Color Coding."

c. Buffer tube colored stripes shall be inlaid in the tube by means of co-extrusion when required. The nominal stripe width shall be 1 mm.

d. For dual layer buffer tube construction cables, standard colors are used for tubes 1 through 12 and standard colors with stripes are used to denote tubes 13 through 24. The color sequence applies to tubes containing fibers only and shall begin with the first tube. The tube color sequence shall start from the inside layer and progress outward.

e. Cable jackets shall be marked with the manufacturer's name or file number, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code®□(NESC®), fiber count, and fiber type, flame rating and listing marking. The height of the marking shall be approximately 2.5 mm.

C. Tight Buffered Indoor/Outdoor Cable (all-dielectric and with interlocking armor)

1. Cable Construction

a. The coated fiber shall have a low friction slip layer placed between the acrylate coating of the optical fiber and the thermoplastic buffer. The diameter of the thermoplastic buffer coating shall be 900 ± 50 µm.

b. Cables with 2 to 24 Fibers:

1. The fibers shall be stranded around a dielectric strength element consisting of all dielectric strength element consisting of aramid strength yarns.
2. Water-blocking, strength yarns shall serve as the tensile strength members of the cable. The strength members shall be a high modulus aramid yarn and shall be water swellable to prevent the migration of water throughout the cable. The water-blocking aramid yarns shall be non-nutritive to fungus, electrically non-conductive and homogeneous.

c. Cable Outer Jacket

1. The jacket shall be continuous, free from pinholes, splits, blisters, or other imperfections. The jacket shall have a consistent, uniform thickness; pressure extruded jackets are not acceptable. The jacket shall be smooth, as is consistent with the best commercial practice. The jacket shall provide the cable with a tough, flexible, protective coating, able to withstand the stresses expected in normal installation and service. The jacket shall not promote the growth of fungus.
2. The jacket color for of all fiber types shall be black.
3. The OFNP cable jacket shall be a flame retardant Polyvinyl Chloride (PVC) containing carbon black, resistant to prolonged ultraviolet light exposure. For cables with 2 to 12 fibers the nominal thickness of the cable jacket shall be 0.8 mm, and for the 18 or 24-fiber cable the nominal thickness of the cable jacket shall be 1.0 mm.
4. The OFNR cable jacket shall be a flame retardant Polyvinyl Chloride (PVC) containing carbon black, resistant to prolonged ultraviolet light exposure. For cables with 2 to 12 fibers the nominal thickness of the cable jacket shall be 0.9 mm, and for the 18 or 24-fiber cable the nominal thickness of the cable jacket shall be 1.0 mm.
5. The cables shall be available with an optional aluminum interlocking armor. The interlocking armor shall be covered with a flame-retardant PVC outer jacket for OFNP and OFNR cables.

d. Identification

1. The individual 900 µm buffered fibers shall be color coded for identification. The optical fiber color coding shall be in accordance with EIA/TIA-598, "Optical Fiber Cable Color Coding."
2. The outer jacket shall be marked with the manufacturer's name or ETL file number, date of manufacture, shop order number, optional SOC code (SR##########), fiber count, fiber type, flame rating, listing symbol, and sequential length markings every two feet.

3.2.6 27 13 23.20 Outdoor Fiber Optic Cable

A. General Specifications

1. The cable shall meet all requirements stated in this specification.
2. The cable shall be an accepted product of the United States Department of Agriculture Rural Utilities Service (RUS) 7 CFR 1755.900 (PE-90) and meet the requirements of ANSI/ICEA Standard for Fiber Optic Outside Plant Communications Cable, ANSI/ICEA S-87-640-2006 and GR-20-CORE.

B. Design Specifications: For outside plant installations, or those meeting the NEC requirements, Corning Cable Systems Outdoor cable shall be used:
   1. ALTOS (all-dielectric)
   2. ALTOS Lite (armored)

C. Outside Plant Cable
   1. Cable Construction
      a. Optical fibers shall be placed inside a loose buffer tube. The nominal outer diameter of the buffer tube shall be 2.5 mm. The buffer tube shall be polypropylene.
      b. Each buffer tube shall contain up to 12 fibers
      c. The fibers shall not adhere to the inside of the buffer tube.
      d. The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrink back requirements of 7 CFR 1755.900.
      e. Fillers may be included in the cable core to lend symmetry to the cable cross-section where needed. Fillers shall be placed so that they do not interrupt the consecutive positioning of the buffer tubes. In dual layer cables, any fillers shall be placed in the inner layer. Fillers shall be nominally 2.5 mm in outer diameter.
      f. The central member shall consist of a dielectric, glass reinforced plastic (GRP) rod (optional steel central member). The purpose of the central member is to provide tensile strength and prevent buckling of the cable. The GRP rod shall be overcoated with a thermoplastic, when required to achieve dimensional sizing to accommodate buffer tubes/fillers.
      g. Each buffer tube shall contain water blocking material embedded in the inside wall of the buffer tube for water-blocking protection. The water blocking material shall be non-nutritive to fungus, electrically non-conductive, and homogeneous. It shall also be free from dirt or foreign matter. This element will preclude the need for other water-blocking material such as gels, yarns, foams, or tapes; the buffer tubes shall be gel-free.
      h. The optical fibers shall not require cleaning before placement into a splice tray or fan-out kit.
      i. Buffer tubes shall be stranded around the dielectric central member using the reverse oscillation, or "S-Z", stranding process.
      j. Water swellable yarn(s) shall be applied longitudinally along the central member during stranding. Water blocking elements shall be applied uniformly throughout the buffer tube.
      k. Two polyester yarn binders shall be applied contrahelically with sufficient tension to secure each buffer tube layer to the dielectric central member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking, and dielectric with low shrinkage.
      l. For single layer cables, a water swellable tape shall be applied longitudinally around the outside of the stranded tubes/fillers. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

m. For dual layer cables, a second (outer) layer of buffer tubes shall be stranded over the original core to form a two-layer core. A water swellable tape shall be applied longitudinally over both the inner and outer layer. The water swellable tape shall be non-nutritive to fungus, electrically non-conductive, and homogenous. It shall also be free from dirt and foreign matter.

n. Non-armored cables shall contain one ripcord under the sheath for easy sheath removal. Armored cables shall contain two ripcords under the steel armor for easy armor removal.

o. All tensile strength shall be provided by the central member.

p. Non-armored cables shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 1.3 mm. Jacketing material shall be applied directly over cable core and water swellable tape. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

q. Armored cables without an inner jacket shall have an armor layer applied directly over the cable core and water swellable tape. The armor shall be a corrugated steel tape, plastic-coated on both sides for corrosion resistance, and shall be applied around cable core and water swellable tape with an overlapping seam with the corrugations in register. The outer jacket shall be applied over the corrugated steel tape armor. The outer jacket shall be a MDPE with a minimum nominal jacket thickness of 1.3 mm. The polyethylene shall contain carbon black to provide ultraviolet light protection and shall not promote the growth of fungus.

r. The MDPE jacket material shall be as defined by ASTM D1248, Type II, Class C, Category 4 and Grades J4, E7 and E8.

s. The jacket or sheath shall be free of holes, splits, and blisters.

2. Identification

a. Each fiber shall be distinguishable by means of color coding in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding." The fibers shall be colored with ultraviolet (UV) curable inks.

b. Buffer tubes containing fibers shall be color coded with distinct and recognizable colors in accordance with TIA/EIA-598-B, "Optical Fiber Cable Color Coding."

c. Buffer tube colored stripes shall be inlaid in the tube by means of co-extrusion when required. The nominal stripe width shall be 1 mm.

d. For cables containing more than 12 buffer tubes, standard colors are used for tubes 1 through 12 and stripes are used to denote tubes 13 through 24. The color sequence applies to tubes containing fibers only and shall begin with the first tube. If fillers are required, they shall be placed in the inner layer of the cable. The tube color sequence shall start from the inside layer and progress outward.

e. Cable jackets shall be marked with the manufacturer's name, month and year of manufacture, sequential meter or foot markings, a telecommunication handset symbol as required by Section 350G of the National Electrical Safety Code®□(NESC®), fiber count, and fiber type.

END OF SECTION

[COMMSCOPE: 27 15 43.15 Communications Fiber Connectors, Adapters and Adapter Panels]

3.2.7 27 11 16.00.00 Fiber Optic Housing Specifications

Fiber optic housings specified in this document include one through four unit-height housings ("1U", "2U, "3U" and "4U"), whereby one industry standard (EIA compliant) rack unit is defined as 44.45 mm in height in compliance with EIA-310-D ("Cabinets, Racks, Panels, and Associated Equipment"). The environment for this hardware is typically an indoor, environmentally controlled building.

The various capacities of the housings specified in this document are listed below:

Unit Size	Panel* Capacity	Fiber Optic Housing Port Capacity:					
*Includes panels, modules &/or cassettes.		6F / Panel	8F / Panel	12F / Panel	16F / Panel	24F / Panel	72F / Panel
		ST/SC/LC	ST/SC/LC	ST/SC/LC	LC only	LC only	MTP only
1U	2	12	16	24	32	48	144
2U	4	24	32	48	64	96	288
3U	6	36	48	72	96	144	432
4U	12	72	96	144	192	288	864

3.2.7.1 Rack-mountable Connector Housing Capacities

A. 1U Patch Panel; Function & Capacity

1U rack-mountable housing (also known as a patch panel) is defined as 1.75 inches (44.45 mm) in height, whereby one EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm.

4. The 1U housing shall provide a base enclosure with removable top covers, front and rear doors, and a slide-out drawer or tray.
    a. The housing shall provide necessary protection from incidental contact, dust and debris that commonly occurs in a premise or enterprise communications network environment or data center.
    b. The housing shall be fully accessible from the top, rear and front sides.

c. The housing shall provide all necessary provisions for proper management and administration of optical fiber, fiber optic connectors, splices, cable-subunits, transition kits and other related components.

5. The 1U rack-mountable connector housing shall support cross-connection, inter- connection and/or splicing applications and routing schemes in the same housing.
    1. The housing shall accommodate direct connectorization via connector panels (as specified in Section 7.0) or in conjunction with slack storage cassettes (as specified in Section 6.0) that hold the connector panels.
        1. Connector panels and modules shall be held in place via interchangeable panel retention clips that snap into position independent of one another onto panel clip retention blocks or components that attach to a slide-out tray or into the tray itself.
        2. The housing shall be capable of holding up to two (2) connector panels, modules or cassettes in a horizontal orientation on a slide-out tray.
    2. The housing shall accommodate pigtail splicing via interchangeable splice cassettes (as specified in Section 5.0) with pigtailed connector panels, while maintaining the capability to accommodate pigtailed connector modules (as specified in Section 8.0) and/or pigtailed connector panels outside of the splice cassettes.
        1. The splice cassettes shall load into the housing between stackable rails that retain the cassette on both sides of the cassette; the center stackable rail shall interface and engage behind the center panel clip retention block [1.2.1.a] and directly onto the slide-out tray or another center stackable rail.
        2. The housing shall be capable of holding up to two (2) splice or slack storage cassettes in a horizontal orientation on a slide-out tray.

B. 1U Jumper Management

The housing's slide-out tray shall provide jumper routing guides in the front to protect and manage jumpers and/or patch-cords that exit and enter through the sides of the front of the housing.

1. The slide-out tray shall incorporate and allow interchangeable attachment of three (3) jumper routing guides.
    a. The front jumper routing guides shall attach to stackable panel clip retention components as specified in Section 1.2 of this document by sliding down and locking into place upon a retention tab via the routing guide's integral retention slot, thereby making the routing guides connected to the sliding tray.
    b. The routing guides shall not interfere with access to adapters from above or below the sliding shelf.
    c. The routing guide shall incorporate a tab on the front surface and an indentation (or finger slot) on the top surface (for use when the housing's top cover is removed) for grasping to manually assist with pulling out the sliding tray; the finger slot shall also be capable of holding connector ferrule protective caps.
    d. The routing guides shall provide pass-through for a bundle of jumpers that comprises a cross-sectional area up to at least one square inch (725 mm2).

e. The routing guides shall incorporate a flexible flapper that allows loading and removal of jumpers from the routing guide while still providing retention capabilities of the jumpers.
f. The routing guides' top and bottom interior surfaces shall be curved or rounded to conform to the bend radii of fiber optic jumper or patch-cords that pass through the guides.
g. The center routing guide shall be labeled with the letters "A" and "B" for specifying and differentiating panel positions within the housing.
h. The routing guides shall be constructed from injection-molded plastic and be a color that matches the housing and slide-out tray.
i. The housing shall be capable of supporting connections to 48 fiber optic jumpers or patch-cords with an outside diameter range of 1.6 mm to 3.0 mm.

C. 1U Front Access

The front of the housing and interior slide-out tray shall be accessible via a tinted translucent door. The door shall be removable from metal hinges by removing a single screw on each side of the door.

1. The door shall contain two slam latches (located on the left and right side of the door) that can individually be de-latched with single-hand operation.
2. The door shall contain provisions for installation of a keyed lock assembly.
3. The door shall allow customization of the applique through in-mold labeling.
4. The door shall contain an area on its inside surface that is hidden from view by the door's applique and is capable of holding adhesive-backed label strips.
5. The door shall contain a crop mark in the upper left portion on the front surface for placement of an adhesive-backed label or label strip.
6. The front of the housing shall contain jumper egress openings on both sides that are aligned with the jumper routing guides specified in Section 1.3 of this document and will provide access for optical fiber jumpers and patch-cords as they enter or exit the front sides of the housing.

D. 1U Rear Access

1. The rear of the housing and interior slide-out tray shall be accessible via a metal door.
   a. The rear door shall be removable from metal hinges by removing a single screw on each side of the door.
   b. The rear door shall contain a turn-latch in the center of the door for opening and closing the door.
   c. The rear door shall allow installation of a keyed latch assembly in the center, which can also serve as the primary means for opening and closing the door.
   d. The rear door shall incorporate pairs of lances that run the length of the door providing a means to strain-relieve incoming fiber optic cables to the inside surface of the door.
   e. The rear door shall incorporate pre-stamped punch-out openings that will allow fiber optic cable to enter the housing perpendicular to the rear of the housing.

2. The rear of the housing shall contain openings on both sides of it that allow fiber optic cables and/or cable sub-units to enter the housing.

E. 1U Top Access

1. The top of the housing shall be accessible via two sliding top covers that converge and interface in the center of the housing via two alternating support tabs.
2. The top covers shall be made from tinted translucent injection-molded plastic.
3. The top covers shall incorporate pockets or slots for containing two label cards (4 inches by 4 inches).
4. The top covers shall contain raised detents that interface with rails on the housing.
5. The top covers shall be able to be locked-down or fixed in place through installation of screws on the side of the housing.

F. 1U Cable Strain-relief

1. The housing shall provide means for strain-relieving fiber optic cables both interior to and exterior to the rear of the housing.
    a. External strain-relief shall be achieved through attachment of an external strain-relief bracket that attaches onto either side of the housing via two fasteners.
        1. The external strain-relief bracket shall be of a two-piece design that allows disassembly and reassembly such that it can be used in a universal fashion on either side of the housing and with either top or bottom cable entry into the housing.
        2. The external strain-relief bracket shall provide slots or holes for securing cables with hook-and-loop type straps.
        3. The external strain-relief bracket shall provide threaded holes for attaching up to two cable clamps, as specified in Section 9.0, and accommodate a range of cable sizes.
        4. Internal strain-relief shall be achieved through one of three means: 1) attachment of a removable and interchangeable internal strain-relief bracket that mounts on the floor of the rear assembly housing via retention studs and a spring-loaded plunger, 2) strain- relieving directly to the inside surface of the door per Section [1.7.4], or
        5. 3) strain-relieving via means specified in Section [1.13] for when cable(s) enter directly through and perpendicular to the rear door.
        6. The internal strain-relief bracket shall strain-relieve a single cable up to 34.0 mm or multiple cables of a comparable bundle diameter.
        7. The internal strain-relief bracket shall incorporate pairs of lances for hook-and-loop type straps or tape.
        8. The internal strain-relief bracket shall contain threaded holes for installation of central member and cable strength yarn strain-relief hardware.
        9. The internal strain-relief bracket shall be installable on either side of the rear of the housing and of a singular design for either side.
        10. The internal strain-relief bracket shall be removable, and its support plate shall not interfere with removal or sliding action of the interior tray.

G. 1U Interior Management

The 1U housing's interior tray shall contain provisions for routing and maintaining fiber optic cable components, including cable sub-units and buffer tubes, 900 µm optical fiber, and buffer tube transition kits.

1. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of fiber retention or slack management clips.
    a. The fiber retention clip shall be made from flexible, durable injection-molded plastic.
    b. The fiber retention clip shall incorporate flexible fingers on the top that allow the quick removal and installation of optical fiber and cable sub-units.
    c. The fiber retention clip shall be of a segmented design with a divider that separates the clips into two sections for greater organized fiber storage capacity.
    d. The fiber retention clip shall be installable and configurable such that they form two groups (either complete or incomplete) in a circular pattern for customized routing of optic fiber.
    e. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of one transitional strain-relief clip.
        1. The transitional strain-relief clip shall be made from flexible durable injection-molded plastic.
        2. The transitional strain-relief clip shall be capable of holding six
        3. Six buffer tube transition or furcation kits that can each manage a single twelve-fiber buffer tube.; the clip shall hold the kits via direct insertion into the clip or additionally through securing with hook-and-loop type straps. Note: Fiber fan-out devices are used to build 250 µm fiber in buffer tubes out to 900
        4. µm for fiber protection and to allow connectorization.
        5. The transitional strain-relief clip shall be stackable utilizing only the integral retention features to affix the clips to one another.
        6. The transitional strain-relief clip shall allow individual access in both removal and installation of individual furcation kits independent of adjacent furcation kits that may or may not be already installed in the clip.
    f. The sliding tray shall contain an embossed pattern that conveys the recommended routing path that optical fiber and cable sub-units follow in routing from cable entry to the adapter panels contained within the housing.
2. The 1U housing's interior tray shall incorporate holes or slots for installation of a center rail that enables installation of two splice cassettes per Section 1.2.2.
3. The 1U housing's interior tray shall contain strain-relief slots on both sides of the rear corners of the tray for securing cables via cable-ties or hook-and-loop type straps that enter directly through the rear door of the housing via pass-through ports specified in Section 1.7.5.
4. The 1U housing's interior tray shall be removable from either the front or rear of the housing.
    a. The tray shall contain detents allowing the tray to lock into multiple positions as it slides out of the housing.
    b. The housing shall contain windows on both sides to allow access to release tabs that enable complete removal of the tray from the rear of the housing.
    c. The tray shall be able to be locked-down or fixed such that it can no longer slide through installation of screws into both the left and right side of the housing.

H. 1U Mounting Provisions

The housing shall be mountable in an EIA-310 compatible 465 mm or 592 mm rack.

1. The housing shall be able to be mounted with both a standard 5-in. (13 cm) frontal projection, and a 3-in. (8 cm) partial-flush projection with the included mounting brackets.
    a. The mounting brackets shall incorporate open slots that allow pre- installation of the mounting screws prior to attachment of the mounting brackets to the rack or frame.
    b. The mounting brackets shall attach to the side of the housing via screws or fasteners, and the sides of the housing shall include threaded mounting holes for both the standard 5-in. (13 cm) frontal projection and the 3-in. (8 cm) partial-flush projection.
    c. The mounting brackets shall be symmetric and of the same design for either side of the housing.
2. The housing shall be able to be mounted with a flush-mount projection through both of the following options:
    a. Through removal of the front door and front jumper routing guides and shifting of the sliding tray forward to a flush-mount position with the bracket installed in the 3-in. (8 cm) partial-flush position.
    b. Through availability of accessory flush-mounting brackets that achieve a recessed mounting with the door of the housing flush with the front plane of the rack or frame while providing holes for jumper egress through the side of the housing.

I. 1U Dimensions

1. The housing shall not exceed a depth requirement of 16.5 inches (42.0 cm), excluding door latches and locks.
2. The housing shall not exceed a width requirement of 17.2 inches (43.5 cm), excluding mounting brackets, fasteners or entry grommets.

J. 1U Materials and Compliance

1. The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0.
2. The connector housings shall have a labeling scheme that complies with ANSI/TIA/EIA- 606.
3. The housing shall contain the following labels that shall be affixed to the base of the front compartment of the housing.
    a. A laser radiation warning label that contains the word "DANGER" in a highlighted color or colored background (preferably red).
    b. A UL listing label that lists the product as a communication circuit accessory (listing 41S4 or equivalent).
    c. A product information label that contains the manufacturer's name, product part number, manufacturing location, date of manufacture, as well as other pertinent information for manufacturing traceability.

4. The housing and/or packaging shall include a hardware accessory kit that includes the following components: 1) installation instructions, 2) fiber optics documentation & administration label, 3) 8" cable ties, 4) 4" cable ties, 5) #12-24 mounting screws.
5. Housings shall be manufactured using materials and colors per Table 1 for structural integrity and shall be finished with a wrinkled black powder coat for durability on exterior metal. Installation fasteners shall be included and shall be black in color.

Attribute	Top Cover	Front Door	Rear Door	Base Housing	Sliding Tray	Related Brackets
Material:	Plastic (1)	Plastic (1)	Metal (2)	Metal (2)	Plastic (3)	Metal (4)
Color:	Clear, Tinted	Clear, Tinted	Black, Corvel	Black, Corvel	Black	Black, Corvel
Finish:	Flat/ Smooth	Flat/ Smooth	Midnight Wrinkle	Midnight Wrinkle	Flat/ Smooth	Midnight Wrinkle
Material Notes:						
(1) Plastic: Flame retardant, UV-stabilized polycarbonate (medium-viscosity)						
(2) Metal: Cold Rolled Steel, 18 Gauge						
(3) Plastic: Polyphenylene ether (PPE) resin - Polystyrene blend, mineral-filled						
(4) Metal: Cold Rolled Steel, 11 Gauge						

Table 1: 1U Housing Materials

K. 2U Patch Panel; Function & Capacity

A 2U rack-mountable housing (also known as a patch panel) is defined as 3.50 inches (88.90 mm) in height per EIA, whereby one EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm. The 2U housing shall meet all of the requirements of the 1U housing with the following exceptions and/or additional requirements:

1. The housing shall be capable of holding up to four (4) connector panels and/or modules in a horizontal orientation on a slide-out tray.
2. The housing shall be capable of holding up to four (4) splice or slack storage cassettes in a horizontal orientation on a slide-out tray.

L. 2U Jumper Management

1. The slide-out tray shall incorporate and allow interchangeable attachment of six (6) jumper routing guides.
2. The center routing guide shall be labeled with the letters "A" and "B" for specifying and differentiating panel positions within the housing.

3. The center routing guide shall be labeled with the letters "C" and "D" for specifying and differentiating panel positions within the housing for the second layer of panels and/or cassettes.
4. The housing shall be capable of supporting connections to 96 fiber optic jumpers or patch-cords with an outside diameter ranging from 1.6 mm to 3.0 mm.

M. 2U Interior Management

1. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of two (2) transitional strain-relief clips.
2. The 2U housing's interior tray shall incorporate holes or slots for installation of two stackable center rails that enable installation of four (4) splice or slack storage cassettes.

N. 3U Patch Panel; Function & Capacity

A 3U rack-mountable housing (also known as a patch panel) is defined as 5.25 inches (133.35 mm) in height per EIA, whereby one EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm. The 3U housing shall meet all of the requirements of the 1U housing with the following exceptions and/or additional requirements:

1. The 3U rack-mountable connector housing shall support cross-connection, inter- connection and/or splicing applications and routing schemes in the same housing.
2. The housing shall be capable of holding up to six (6) connector panels and/or modules in a horizontal orientation on a slide-out tray.
3. The housing shall be capable of holding up to six (6) splice or slack storage cassettes in a horizontal orientation on a slide-out tray.

O. 3U Jumper Management

1. The slide-out tray shall incorporate and allow interchangeable attachment of nine (9) jumper routing guides.
2. The center routing guide shall be labeled with the letters "A" and "B" for specifying and differentiating panel positions within the housing.
3. The center routing guide shall be labeled with the letters "C" and "D" for specifying and differentiating panel positions within the housing for the second layer of panels and/or cassettes.
4. The center routing guide shall be labeled with the letters "E" and "F" for specifying and differentiating panel positions within the housing for the third layer of panels and/or cassettes.
5. The housing shall be capable of supporting connections to 144 fiber optic jumpers or patch-cords with an outside diameter ranging from 1.6 mm to 3.0 mm.

P. 3U Interior Management

1. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of three (3) transitional strain-relief clips.
2. The 3U housing's interior tray shall incorporate holes or slots for installation of two stackable center rails that enable installation of six (6) splice or slack storage cassettes.

Q. 4U Patch Panel; Function & Capacity

A 4U rack-mountable housing (also known as a patch panel) is defined as seven inches (178 mm) in height per EIA, whereby one EIA rack space or panel height (denoted as 1U) is defined as being 44.45 mm.

1. The 4U rack-mountable connector housing shall support cross-connection, inter- connection and/or splicing applications and routing schemes in the same housing.
2. The housing shall accommodate direct connectorization via connector panels (as specified in Section 7.0) or in conjunction with slack storage cassettes (as specified in Section 6.0) that hold the connector panels.
    a. Connector panels and modules shall be held in place via interchangeable panel retention clips that snap into position independent of one another on both the top and bottom of the housing.
    b. The housing shall be capable of holding up to twelve (12) connector panels and/or modules.
3. The housing shall accommodate pigtail splicing via interchangeable splice cassettes (as specified in Section 5.0) with pigtailed connector panels, while maintaining the capability to accommodate connector-pigtail modules (as specified in Section 8.0) and pigtailed connector panels outside of the splice cassettes.
    a. The splice cassettes shall load into the housing on interchangeable and/or permanent independent tracks, rails or guides that retain the cassette on both the top and bottom surfaces of the housing.
    b. The housing shall be capable of holding up to twelve (12) splice or slack storage cassettes.

R. 4U Jumper Management and Front Access

The main housing shall contain a front jumper assembly compartment whose function is to protect and manage jumpers and/or patch-cords that interface with the main housing behind it.

1. The front jumper assembly compartment shall be removable and attached via mounting screws and support tabs.
2. The front jumper assembly compartment shall be accessible via a tinted translucent door.
    a. The door shall be removable from hinge pins by deflecting a plastic stop-tab that can be flexed, permitting the door to slide laterally off of the hinge pins.
    b. The door shall contain two slam latches (located on the left and right side of the door) that can individually be de-latched with single hand operation.
    c. The door shall contain provisions for installation of a keyed lock assembly.
    d. The door shall contain provisions for holding two label cards (approximately 8" by 4").
    e. The door shall allow customization of the applique though in-mold labeling.
3. The front jumper assembly shall contain jumper egress openings on both sides that are edged with rubber pass-through grommets that provide bend radius support for optical fiber jumpers and patch-cords.
4. The front jumper assembly shall contain four (4) jumper management routing clips on both the floor and ceiling of the compartment.
    a. The clips shall be spaced equidistant relative to one another.

   b. The clips shall have flexible fingers permitting the installation and removal of jumpers and/or patch-cords from the front of the clips.
   c. The clips shall each be capable of holding at least 144 (2.0 mm) jumpers or patch-cords.
5. The front jumper assembly shall contain two pass-through grommets on the top for jumper egress to other housings or equipment racks.

S. 4U Rear Access

1. The rear assembly housing shall be accessible via a metal door
   a. The door shall contain a routing and cable sub-unit slack storage bracket for interior management of cable sub-units and buffer tubes; the plate shall provide various lances for hook-and-loop type strap installation to that end.
   b. The door shall contain two slam latches (located on the left and right side of the door) that can individually be de-latched with single hand operation.
   c. The door shall contain provisions for installation of a keyed lock assembly.
   d. The door shall be removable from hinge pins by deflecting a metal stop-tab on the housing that can be flexed, permitting the door to slide laterally off of the hinge pins.
2. The housing shall contain a brushed entry on both sides of the rear of the housing that converges with the rear door and covers the full height of the housing.
   a. The brushed entries shall be removable by sliding directly out from the housing after deflecting plastic retention tabs on the housing.
   b. The brushed entries shall each be of a singular one-piece design that incorporates bristles that are two inches (50 mm) in length and are retained by a metal spine.
   c. The bristles of the brushed entries shall be capable of preventing dust from accumulating on the interior of the housing.

T. 4U Top Access

The housing shall contain a removable top cover that slides on and off the rear assembly housing. The top cover shall contain relief holes on its left and right sides that will allow it to be held in place by flexible retention tabs on the left and right sides of the housing. The top cover shall contain two pass-through grommets on its rear edge.

U. 4U Cable Strain-relief

The housing shall provide means for strain-relieving fiber optic cables both interior and exterior to the rear of the housing.

1. External strain-relief shall be achieved through attachment of an external strain- relief bracket that slides onto either side of the housing and attaches in a tool- less "snap-on" manner via flexible retention tabs or buttons.
   a. The external strain-relief bracket shall provide slots or holes for securing cables with hook-and-loop type straps.
   b. The external strain-relief bracket shall provide threaded holes for attaching up to two cable clamps, as specified in Section 9.0, and accommodate a range of cable sizes.

2. Internal strain-relief shall be achieved through attachment of an internal strain- relief bracket that mounts on the floor of the rear assembly housing via retention tabs, feet or hooks and spring-loaded plunger.
    a. The internal strain-relief bracket shall strain-relieve a single cable up to 34.0 mm or multiple cables of a comparable bundle diameter.
    b. The internal strain-relief bracket shall incorporate slots for fast and unencumbered installation of rubber straps or hook-and-loop type straps and tape.
    c. The internal strain-relief bracket shall contain a threaded hole for installation of central member and cable strength yarn strain-relief hardware.

V. 4U Interior Management

The rear housing assembly shall contain provisions for routing and maintaining fiber optic cable components, including cable sub-units and buffer tuber, 900 µm optical fiber, and buffer tube transition kits.

1. The floor/base of the rear assembly housing shall provide holes or slots for the installation (and removal) of fiber retention or slack management clips.
    a. The fiber retention clip shall be made from flexible, durable injection- molded plastic.
    b. The fiber retention clip shall incorporate flexible fingers on the top that allow the quick removal and installation of optical fiber and cable sub-units.
    c. The fiber retention clip shall be of a segmented design with a divider that separates the clip into two sections for greater organized fiber storage capacity.
2. The floor/base of the rear assembly housing shall provide holes or slots for the installation (and removal) of transitional strain-relief clips.
    a. The transitional strain-relief clip shall be made from flexible durable injection-molded plastic.
    b. The transitional strain-relief clip shall be capable of holding six (6) buffer tube transition kits that can each manage a single twelve-fiber buffer tube.
    c. Fiber fan-out devices are used to build 250 µm fiber in buffer tubes out to 900 µm for fiber protection and to allow connectorization.
3. The transitional strain-relief clip shall be stackable utilizing only the integral retention features to affix the clips to one another.

W. 4U Mounting Provisions

1. The housing shall be mountable in an EIA-310 compatible 465 or 592mm rack.
    a. The housing shall be mounted with a 5-inch (13 cm) frontal projection with the option to flush mount through removal of the front jumper assembly.
    b. The mounting brackets shall incorporate slots that allow pre-installation of the mounting screws prior to attachment of the mounting brackets to the rack or frame.
    c. The mounting brackets shall slide into the side of the housing and attach in a tool-less "snap-on" manner via flexible retention tabs or buttons.

d. The rear housing assembly shall be removable from the mounting brackets through depressing internal buttons on both sides of the housing and sliding the housing off of the mounting brackets.
e. For full-flush mounting and partial flush-mounting (3-inch/8 cm) the housing shall be available with optional accessory brackets that include openings that preserve jumper egress on both sides of the housing.

X. 4U Dimensions

1. The housing shall not exceed a depth requirement of 16.5 inches (42.0 cm), excluding door latches and locks.
2. The housing shall not exceed a width requirement of 17.5 inches (44.5 cm), excluding mounting brackets, fasteners or entry grommets.

Y. 4U Materials and Compliance

1. The unit shall meet the design requirements of ANSI/TIA/EIA-568 and the plastics flammability requirements of UL 94 V-0.
2. The connector housings shall have a labeling scheme that complies with ANSI/TIA/EIA-606.
3. The housing shall contain the following labels that shall be affixed to the base of the front compartment of the housing:
    a. A laser radiation warning label that contains the word "DANGER" in a highlighted color or colored background (preferably red).
    b. A UL listing label that lists the product as a communication circuit accessory (listing 41S4 or equivalent).
    c. A product information label that contains the manufacturer's name, product part number, manufacturing location, date of manufacturer, as well as other pertinent information for manufacturing traceability.
4. The housing and/or packaging shall include a hardware accessory kit that includes the following components:
    a. installation instructions
    b. fiber optics label
    c. Hook-and-loop type straps
    d. #12-24 mounting screws
5. Housings shall be manufactured using materials and colors per Table 4 for structural integrity and shall be finished with a wrinkled black powder coat for durability on exterior metal. Installation fasteners shall be included and shall be black in color

Attribute	Top Cover	Front Door	Rear Door	Base Housing	Jumper Housing	Related Brackets
Material:	Metal (2)	Plastic (1)	Metal (2)	Metal (2)	Metal (3)	Metal (4)
Color, Exterior:	Black, Corvel	Clear, Tinted	Black, Corvel	Black, Corvel	Black, Corvel	Black, Corvel
Finish:	Midnight Wrinkle	Flat/ Smooth	Midnight Wrinkle	Midnight Wrinkle	Midnight Wrinkle	Midnight Wrinkle
Color, Interior:	Platinum	N/A	Black, Corvel	Platinum	Platinum	N/A
Material Notes:						
(1) Plastic: Flame retardant, UV-stabilized polycarbonate (medium-viscosity)						
(2) Metal: Cold Rolled Steel, 18 Gauge						
(3) Metal: Aluminum, 16 Gauge						
(4) Metal: Cold Rolled Steel, 16 Gauge						

Table 4: 4U Housing Materials

Z. Splice Cassettes

Rack mountable housings shall accept an interchangeable splice cassette. A splice cassette is defined as a removable module that is capable of holding a connector panel and splice organizer for pigtail and through splicing applications. The splice cassette shall have the following characteristics:

1. The splice cassette shall consist of a base constructed from injection-molded black plastic and a removable hinged lid or cover constructed from injection- molded tinted translucent plastic.
2. The splice cassette shall allow one connector panel (as described in Section 7.0) to be installed into the base.
3. The splice cassette shall be able to hold and contain at least one meter of pigtail fiber slack on the interior floor of the base.
4. The splice cassette shall be available with pre-installed connector pigtails and panels.
5. The splice cassette shall be able to hold and contain up to one meter of 2.0-3.0 mm buffer tube slack or jacketed pigtail slack (up to 24 fiber) on the exterior bottom of the base.
6. The splice cassette shall contain a pivoting (and removable) splice tray above the base in a horizontal position that rotates up into a vertical position at least 90 degrees relative to the base allowing access to the base.
    a. The splice tray shall contain one interchangeable splice organizer capable of holding either up to (24) splice heat-shrinks or up to (6) ribbon fiber heat-shrinks.

   b. The splice tray shall contain routing tabs and provisions for holding a total of two meters of 250 or 900 µm fiber slack, or 12-fiber ribbon slack (includes both incoming and outgoing fiber slack).
   c. The splice tray shall contain slots and provisions for installing hook-and-loop type straps for securing incoming and outgoing buffer tubes and/or jacketed optical fibers.
7. The splice cassette shall contain relief slots for holding up to two ribbon or buffer tube transition ("fan-out") kits on either side of the base.
8. The splice cassette shall contain two fiber retention tabs behind the connector panel location to maintain fiber below the connections and adapters in an installed connector panel.
9. The splice cassette shall contain two flexible curved tabs for grasping the cassette during installation and removal from the main connector housings.
10. The splice cassette shall contain integral slots on both sides of the cassette to hold and guide the cassette along tracks in the main connector housings.
11. The splice cassette lid/cover shall contain two retention tabs that snap onto the base and also provide slots for securing in a closed position with cable ties.
12. The splice cassette shall ship with a quick-start installation and routing label affixed to the lid/cover that is easily removable and leaves no residue or marking on the lid / cover.
13. The splice cassette shall have a permanent U.L. label affixed that contains the following information:
    a. Okay U.L. Listing number 41s4 (Communication Circuit Accessory)
    b. Country of Origin (for assembly)
    c. Date and Lot number for manufacturing traceability
14. The splice cassette shall have a permanent Part Number label affixed that contains the following information:
    a. Product part number (manufacturer's catalog number)
    b. Product serial number
    c. Country of manufacturer

AA. Slack Storage Cassettes

Rack mountable housings shall accept an interchangeable slack storage cassette. A slack storage cassette is defined as a removable module that is capable of holding a connector panel and cable sub-unit and/or fiber slack. The slack storage cassette shall have the following characteristics:

1. The slack storage cassette shall consist of a base constructed from injection- molded plastic and a removable hinged lid or cover constructed from injection- molded plastic.
2. The slack storage cassette shall allow one connector panel (as described in Section 7.0) to be installed into the base.
3. The slack storage cassette shall be able to hold and contain at least one meter of pigtail fiber slack on the interior floor of the base.
4. The slack storage cassette shall be able to hold and contain up to one meter of 2.0-3.0 mm buffer tube slack or jacketed pigtail slack (up to 24 fiber) on the exterior bottom of the base.
5. The slack storage cassette shall contain relief slots for holding up to two ribbon or buffer tube transition ("fan-out") kits on either side of the base.
6. The slack storage cassette shall contain two fiber retention tabs behind the connector panel location to maintain fiber below the connections and adapters in an installed connector panel.

7. The slack storage cassette shall contain two flexible curved tabs for grasping the cassette during installation and removal from the main connector housings.
8. The slack storage cassette shall contain integral slots on both sides of the cassette to hold and guide the cassette along tracks or rails in the main connector housing.
9. The slack storage cassette lid/cover shall contain two retention tabs that snap onto the base and also provide slots for securing in a closed position with cable ties.
10. The slack storage cassette shall ship with a quick-start installation and routing label affixed to the lid/cover that is easily removable and leaves no residue or marking on the lid / cover.
11. The slack storage cassette shall have a permanent U.L. label affixed that contains the following information:
    a. U.L. Listing number 41s4 (Communication Circuit Accessory)
    b. Country of Origin (for assembly)
    c. Date and Lot number for manufacturing traceability
12. The slack storage cassette shall have a permanent Part Number label affixed that contains the following information:
    a. Product part number (manufacturer's catalog number)
    b. Product serial number
    c. Country of manufacturer

BB. Connector Panels

Rack and wall mountable connector housings shall accept an interchangeable connector panel. A connector panel is defined as a modular removable plate containing optical fiber connector adapters. The connector panel shall have the following characteristics:

1. The connector panel shall utilize a single mounting footprint and shall be available with various connector adapters and different adapter counts in each panel.
2. The connector panel shall be interchangeable between the rack and wall- mountable hardware being proposed.
3. The panel shall be attached to the housing or splice or slack storage cassette with two push-pull latches to allow quick installation and removal.
4. The connector panel shall be available with industry standard single fiber and small form factor multi-fiber adapters.
5. Icons: For those panels that allow them, icons must be removable.
    a. To identify the circuits, icons shall be available with the following symbols: blank, telephone, computer, and CATV.
    b. The icons shall also be available in the following colors: yellow, red, green, blue, and white.
6. Panels shall be manufactured from injection molded plastic or from metal for structural integrity.
7. Panels shall be finished with a wrinkled black texture to match other hardware.
8. Blank connector panels shall be available to fill unused space within the housings.
    a. The blank connector panel shall be attached with at least two spring clips to allow quick installation and removal.
    b. Housings shall be supplied with blank connector panels for all available positions unless the housing is ordered with optical fiber adapters.

   c. The blank panels shall be manufactured from injection molded polycarbonate and shall be finished with a wrinkled black texture to match the housing.
9. Connector panel adapter fiber positions shall be numbered per the natural numbers starting with the number one and proceeding up to the maximum fiber capacity for the panel.
10. All connector panels shall ship with dust caps or covers installed in the fiber optic adapters or ports.

CC. Connector Modules

Rack mountable connector housings shall accept an interchangeable connector module. A connector module is defined as a modular removable case containing optical fiber connector adapters and provisions for strain-relief, slack storage, and the furcation of fiber optic cables. The connector module shall have the following characteristics:

1. The connector module shall consist of a panel built into a protective case with a removable cover for access to the interior connectors and fibers.
2. The connector module shall utilize a single mounting footprint and shall be available with various connector adapters and different adapter counts in each module.
3. The module shall be attached with two push-pull latches to allow quick installation and removal.
4. The connector module shall be available with industry standard single fiber and small form factor multi-fiber adapters.
5. The connector module shall include removable icons that identify the circuits.
   a. As a minimum, these icons shall be available with the following symbols: blank, telephone, computer, or CATV.
   b. The icons shall also be available in the following colors: yellow, red, green, blue, and white.
6. Modules shall be manufactured from 16 gauge cold rolled steel or injection molded plastic for structural integrity.
7. Modules shall be finished with a wrinkled black texture to match other hardware.
8. Modules shall be available in the following configurations: adapter modules, pigtailed modules, and pre-terminated system modules.
9. Connector module adapter fiber positions shall be numbered per the natural numbers starting with the number one and proceeding up to the maximum fiber capacity for the panel.
10. All connector modules shall ship with dust caps or covers installed in the fiber optic adapters or ports.

DD.Cable Clamping Mechanism

The housing shall include the capability to install a clamshell-type cable clamping mechanism to provide cable strain relief.

1. The cable clamp shall accept one cable from 9.5 to 28.6 mm in diameter.
2. The cable clamp mechanism shall also handle multiple smaller fiber count cables when used with the multiple cable insert, or through the application of friction tape to individual cables so as to form a single bundle that can be contained by the clamp.
3. The total cable capacity per clamp shall be five cables (whose individual diameter is up to 10.0 mm) when used with the multiple-cable insert.

4. Housing cable clamp capacity shall be at least two clamps per external strain-relief bracket for the housings; cable clamps shall be available as an accessory kit.

3.2.8 27 11 19 Communications Termination Blocks and Patch Panels

Adhere to the following general specifications:

A. Panel shelves and wall-mount housing shall be used for a combination of splicing pigtails, direct connector termination, or plug-and-play cabling. Shelf shall be designed for use as termination shelf only (direct connector termination) or as splice and termination shelf.
B. Building riser cabling shall not terminate directly to equipment, and patch panels shall be installed at both the headend and remote locations. Panels shall be sized to match fiber and/or copper termination count of cable being installed as well as allow for future expansion.
C. Optical splitter modules, if required, shall be utilized with integrated PON solutions:
    1. Shall be able to mount in panel shelves or panel housings
    2. Shall utilize the OS2 single-mode (OS2) fiber category
    3. Shall support SC APC or LC APC fiber connectors
    4. Shall utilize connected pigtail jumpers or support ports for fiber jumpers
    5. May utilize different split ratios based on project requirements such as 1x8 – 1x32
    6. Shall support a wavelength range of 1260-1360 and 1480-1626 nm
D. Fiber terminations for converged solutions at a zone or end locations shall be terminated into appropriately sized fiber panels or small wall terminals.
E. Fiber termination hardware
    1. Fiber connector housings:
        a. Shall fit in standard 19 in racks or wall mountable housings.
        b. Shall hold 1 to 12 panels/modules/splice cassettes/splitters per housing.
    2. Fiber patch panels:
        a. Shall support single-mode LC/APC and LC/UPC or SC/APC and SC/UPC adapters.
        b. Shall support 12 or 24 counts
        c. Shall support a patch panel option that can mount up to 6 keystone modules for fiber or DC power patching
    3. Fiber splice cassettes:
        a. Shall support single-mode LC/APC and LC/UPC or SC /APC and SC/UPC adapters.
        b. Shall support 12 or 24 counts
        c. Shall support fusion splicing for individual or ribbon fibers.

3.2.9 27 13 23.25 Fiber Optic Connectors

A. General Specifications
    1. Connectors shall be field-installable no-epoxy/no-polish LC, SC, or ST connectors and meet all requirements in this specification
    2. The following documents may be used as references.
        a. EIA/TIA-455-A Standard Test Procedures for Optical Fiber Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components (FOTPs)

b. TIA/EIA-604-2 Fiber Optic Connector Intermateability Standard, FOCIS-2 (ST Compatible)
c. TIA/EIA-604-3A Fiber Optic Connector Intermateability Standard, FOCIS-3 (Type SC)
d. TIA/EIA-604-10A Fiber Optic Connector Intermateability Standard, FOCIS-10 (Type LC)

B. Design Specifications: Corning Cable Systems UniCam connectors
C. Physical Specifications
   1. The connector shall provide a strain relief mechanism for installation on 900um buffered fiber or single fiber cable that contains strength elements. The fiber within the body of the connector shall be isolated mechanically from cable tension, bending and twisting.
   2. The connector shall be designed to comply with the appropriate TIA/EIA FOCIS document.
   3. The ST compatible, SC and LC connectors shall secure to the field fiber via a rotating cam which shall be situated on the connector body and the camming action shall be performed with the use of a connector terminating tool designed for that purpose. Upon rotation of the cam, the connector shall then be permanently secured to the fiber by the crimping of the connector lead in tube via the connector terminating tool.
   4. The connector ferrule shall be made from a homogenous polymer or ceramic material
D. Installation Specifications
   1. The ST compatible, SC, and LC connectors shall be installable upon 900 µm buffered fiber in one minute or less.
   2. The connector installation tool kit shall be able to be used to terminate all of the above connector types. The tool shall contain an integrated continuity test system, to provide immediate Go/No-Go feedback of successful connectivity.
   3. The connector shall not require polishing of the endface in the field. Connectors shall have a factory-polished fiber stub in the connector ferrule.
   4. The connector installation shall not require the use of epoxies.
E. The connector shall be available in individual single-packages, or in bulk organizer packs of 25. The packaging will indicate the supplier part number, connector type, and date code.
F. Performance Requirements
   1. Connectors shall comply with the following insertion loss performance when testing in accordance with FOTP-171
      a. Singlemode: ≤ 0.2 dB (average) and ≤ 0.5 dB (maximum)
      b. Multimode: ≤ 0.1 dB (average) and ≤ 0.5 dB (maximum)
   2. Connectors shall comply with the following performance testing in Table 4.

Table 4: Performance Test Requirements for Connectors

Test	Test Method (FOTP #)	Test Conditions	Requirement*
Insertion Loss (IL)	171	concatenation method	Average: 0.1 dB Max IL : 0.5 dB
Return Loss (RL)	107	coupler with power source and meter	Minimum RL: ≤-20 dB Minimum RL: ≤-26 dB LOMMF
Low Temp Soak	188	4 days @ 0°C	Max IL : 0.75 dB Min RL: 20 dB
Temperature Life	4	4 days @ 60°C	Max IL : 0.75 dB Min RL: 20 dB
Humidity	5	4 days @ 40°C RH 90-95%	Max IL : 0.75 dB Min RL: 20 dB
Impact	2	8 impacts from 1.8 meters (height)	Max IL : 0.75 dB Min RL: 20 dB
Strength of Coupling Mech.	185	33 N at 0° for 5 seconds	Max IL : 0.75 dB Min RL: 20 dB
Durability	21	500 rematings, clean every 25	Max IL : 0.75 dB Min RL: 20 dB
Cable Retention 0°	6	0.5 lb. on 900 µm buffered fiber for 5 seconds	Delta IL: ≤ 0.5 dB Max IL: 0.75 dB Min RL: 20 dB
Cable Retention 90°	6	0.5 lb. on 900 µm buffered fiber for 5 seconds	Delta IL: ≤ 0.5 dB Max IL: 0.75 dB Min RL: 20 dB
Flex	1	±90° for 100 cycles @ 0.5 lb. load on 900 µm buffered fiber	Max IL : 0.75 dB Min RL: 20 dB
Twist	36	10 cycles 5 turns, 0.5 lb. load on 900 µm buffered fiber	Max IL : 0.75 dB Min RL: 20 dB

32.10 27 13 23.30 Fiber Optic Adapter Panels

A. General Specifications

1. Rack and wall mountable connector housings shall accept an interchangeable connector panel. An adapter panel is defined as a modular removable plate containing optical fiber connector adapters.

2. Fiber optic adapter panels shall meet all requirements in this specification

B. Design Specifications: Corning Cable Systems LANscape CCH Adapter Panels and Pigtailed Panels

C. Physical Specifications

1. The adapter panel shall utilize a single mounting footprint and shall be interchangeable between the rack and wall mountable hardware used.
2. The panel shall be attached with two push-pull latches to allow quick installation and removal.
3. The adapter panel shall be available with industry standard single fiber and small form factor multi-fiber adapters, including the SC duplex, ST compatible, LC duplex and MTP.
4. The adapter panel shall accommodate OM3, OM4, and OS2 optical fiber.
5. Panels shall be manufactured from injection molded polycarbonate for structural integrity.
6. Panels shall be finished with a wrinkled black texture.
7. Pigtailed panel shall consist of an adapter panel as described above, factory-loaded with factory-terminated pigtails, 3 m in length. The pigtails shall be available in a variety of cable options, a MIC® Cable subunit or ribbon fiber.
8. Blank adapter panels shall be available to fill unused space within housings. The blank panels shall be manufactured from injection molded polycarbonate and shall be finished with a wrinkled black texture to match the housing. Housings shall be supplied with blank adapter panels for all available positions unless the housing is ordered with optical fiber adapters panels pre-installed. The blank panel shall be attached with at least two spring clips to allow quick installation and removal.

3.2.11 27 13 23.32 Fiber Optic Splice Cassettes

A. General Specifications

1. Rack mountable housings shall accept an interchangeable splice cassette. A splice cassette is defined as a removable module that is capable of holding a connector panel and splice organizer for pigtail and through splicing applications.
2. Fiber optic splice cassettes shall meet all requirements in this specification

B. Design Specifications: Corning Cable Systems LANscape CCH Splice Cassettes

C. Physical Specifications

1. The splice cassette shall consist of a base constructed from injection-molded black plastic and a removable hinged lid or cover constructed from injection-molded tinted translucent plastic.
2. The splice cassette shall be available with pre-installed connector pigtails and panels.
3. The splice cassette shall allow one connector panel (as described in 27 13.23.30) to be installed into the base.
4. The splice cassette shall be able to hold and contain at least one meter of pigtail fiber slack on the interior floor of the base.
5. The splice cassette shall be able to hold and contain up to one meter of 2.0-3.0 mm buffer tube slack or jacketed pigtail slack (up to 24 fiber) on the exterior bottom of the base.
6. The splice cassette shall contain a pivoting (and removable) splice tray above the base in a horizontal position that rotates up into a vertical position at least 90 degrees relative to the base allowing access to the base.
    a. The splice tray shall contain one interchangeable splice organizer capable of holding up to (24) splice heat-shrinks, routing tabs and provisions for holding a total of two meters of 250 or 900 micron fiber slack, or 12-fiber ribbon slack (includes both incoming and

outgoing fiber slack) and contain slots and provisions for securing incoming and outgoing buffer tubes and/or jacketed optical fibers.

7. The splice cassette shall contain relief slots for holding up to two buffer tube transition ("fan-out") kits on either side of the base.
8. The splice cassette shall contain two fiber retention tabs behind the connector panel location to maintain fiber below the connections and adapters in an installed connector panel.
9. The splice cassette shall contain two flexible curved tabs for grasping the cassette during installation and removal from the main connector housings.
10. The splice cassette shall contain integral slots on both sides of the cassette to hold and guide the cassette along tracks in the main connector housings.
11. The splice cassette lid/cover shall contain two retention tabs that snap onto the base and also provide slots for securing in a closed position with cable ties ("ty-wraps").
12. The splice cassette shall have a permanent U.L. label affixed that contains the following information: U.L. Listing number 41s4 (Communication Circuit Accessory), Country of Origin (for assembly) and Date and Lot number for manufacturing traceability.
13. The splice cassette shall have a permanent Part Number label affixed that contains the following information: Product description, Product part number (manufacturer's catalog number), Product serial number, Country of manufacturer, and U.S. Patent number.

3.2.12 27 13 23.35 Fiber Optic Housings

A. General Specifications
   1. Fiber Optic housings shall provide a means for securing, strain-relieving, protecting, and labeling of fiber optic cable terminations. Housings shall be available in both rack-mount and wall-mount configurations and accept one standard adapter panel footprint for all housings.
   2. Fiber optic housings shall meet all requirements in this specification

B. Design Specifications
   1. Corning Cable Systems Closet Connector Housing (CCH), rack-mount
   2. Corning Cable Systems Wall-mount Connector Housing (WCH), wall-mount

C. Rack-Mount Housing Specifications
   1. Housings shall be designed for rack-mounted or frame-mounted applications that support conventional cross-connection and interconnection schemes as well as splicing applications.
   2. Housings shall be available in 1U, 2U, 3U and 4U. One industry standard (EIA compliant) rack unit or panel height (denoted as 1U) is defined as being 44.45 mm (1.75") in height in compliance with EIA-310-D ("Cabinets, Racks, Panels, and Associated Equipment").
   3. The housings shall have capacity specifications as listed below in Table 5.

Table 5: Rack Mount Housing Fiber Capacity

Unit Size	Panel Capacity	Housing Fiber Capacity, using:		
		6f / panel	12f / panel	24f / panel
1U	2	12	24	48
2U	4	24	48	96
3U	6	36	72	144
4U	12	72	144	288

4. The housings shall meet the design requirements of ANSI/TIA/EIA-598 and the plastics flammability requirements of UL 94 V-0.
5. The connector housings shall have a labeling scheme that complies with ANSI/TIA/EIA- 606.
6. The housings shall be mountable in an EIA-310 compatible 465mm or 592mm rack.
    a. The housings shall be mounted with a 12 cm frontal projection with the option to flush mount.
    b. The mounting brackets shall incorporate tear-drop shaped slots that allow pre-installation of the mounting screws prior to attachment of the mounting brackets to the rack or frame, by symmetric and of the same design for either side of the housing, attach to the side of the housing via screws or fasteners for the 1U, 2U, and 3U, slide into the side of the housing and attach in a "snap-on" manner via flexible retention tabs or buttons for the 4U.
    c. The 4U housing rear assembly shall be removable from the mounting brackets through depressing internal buttons on both sides of the housing and sliding the housing off of the mounting brackets.
7. The housings shall support cross-connection, inter-connection and/or splicing applications and routing schemes in the same housing.
    a. The housings shall accommodate direct connectorization via connector panels as specified in 27 13 23.30.
    b. The housings shall accommodate pigtail splicing and through splicing via interchangeable splice cassettes, as specified in 27 13 23.32.
8. 1U, 2U, and 3U Housings
    a. The housings shall have removable top covers, front and rear doors, and a slide-our drawer or tray, and be fully accessible from the top, rear and front sides.
    b. The housing's slide-out tray shall provide jumper routing guides in the front to protect and manage jumpers.
        1. The slide-out tray shall incorporate and allow interchangeable attachment of three (3) jumper routing guides. They shall attach to either panel clip retention blocks or stackable rails. The routing guide shall incorporate an indentation on the top surface for grasping to manually assist with pulling out the sliding tray.

c. The front of the housing and interior slide-out tray shall be accessible via a tinted translucent door. It shall also contain jumper egress openings on both sides.
    1. The door shall be removable from metal hinges by removing a single screw on each side of the door.
d. The rear of the housings and interior slide-out tray shall be accessible via a metal door. The rear door shall incorporate pre-stamped punch-out openings that will allow fiber optic cable to enter the housing perpendicular to the rear of the housing.
    1. The rear door shall be removable from metal hinges by removing a single screw on each side of the door
e. The top of the housings shall be accessible via two slide-out top covers that converge and interface in the center of the housings via two alternating support tabs.
    1. The top covers shall be made from tinted translucent injection-molded plastic and incorporate pockets or slots for containing two labels cards.
f. The housing shall provide means for strain-relieving fiber optic cables.
g. External strain-relief shall be achieved through attachment of an external strain-relief bracket that attaches onto either side of the housing via two fasteners.
    1. The external strain-relief bracket shall be of a two-piece design that allows disassembly and reassembly such that it can be used in a universal fashion on either side of the housing and with either top or bottom cable entry into the housing.
h. Internal strain-relief shall be achieved through attachment of an internal strain relief bracket that mounts on the floor of the rear of the housing via retention studs and a spring-loaded plunger.
    1. The internal strain-relief bracket be installable on either side of the rear of the housing and of a singular design for either side and be removable and its support plate shall not interfere with removal or sliding action of the interior tray.
i. The housing's interior tray shall contain provisions for routing and maintaining fiber optic cable components, including cable sub-units and buffer tuber, 900 um optical fiber, and buffer tube transition kits.
    1. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of fiber retention or slack management clips.
    2. The sliding tray of the housing shall provide holes or slots for the installation (and removal) of transitional strain-relief clips
    3. The sliding tray shall contain an embossed pattern that conveys the routing path that optical fiber and cable sub-units should follow in routing from cable entry to the fiber optic panels contain within the housing.

9. 4U Housing
    a. The housing shall contain a front compartment whose function is to protect and manage jumpers that interface with the main housing behind it. The front jumper assembly compartment shall be removable and attached via mounting screws and support tabs and be accessible via a tinted translucent door.
    b. The front compartment shall contain jumper egress openings on both sides that are edged with rubber pass-through grommets that provide bend radius support for optical fiber jumpers, contain two pass-through grommets on the top for jumper egress to

other housings or equipment racks and contain four (4) jumper management routing clips on the floor and ceiling of the compartment.

1. The clips shall be spaced equidistant relative to one another, have flexible fingers permitting the installation and removal of jumpers and/or patchcords from the front of the clips and be capable of holding at least 144 (2.0 mm) jumpers or patchcords.

c. The rear assembly housing shall be accessible via a metal door. The door shall contain a routing and cable sub-unit slack storage bracket for interior management of cable sub-units and buffer tubes.

d. The housing shall contain a brushed entry on both sides of the rear of the housing.

e. The housing shall contain a removable top cover.

f. The housing shall provide means for strain-relieving fiber optic cables both interior to and exterior on the rear assembly housing.

1. External strain-relief shall be achieved through attachment of an external strain-relief bracket that slides onto either side of the housing and attaches in a "snap-on" manner via flexible retention tabs or buttons.
2. Internal strain-relief shall be achieved through attachment of an internal strain-relief bracket that mounts on the floor of the rear assembly housing via retention tabs, feet or hooks and spring-loaded plunger.

g. The rear of the housing shall contain provisions for routing and maintaining fiber optic cable components, including cable sub-units and buffer tuber, 900 um optical fiber, and buffer tube transition kits.

h. The floor/base of the rear of the housing shall provide holes or slots for the installation (and removal) of fiber retention or slack management clips.

i. The floor/base of the rear assembly housing shall provide holes or slots for the installation (and removal) of transitional strain-relief clips.

1. The transitional strain-relief clips shall be capable of holding six (6) buffer tube transition kits that can manage each manage a single twelve-fiber buffer tube. Fiber fan-out devices are used to build 250 um fiber in buffer tubes out to 900 um for fiber protection and to allow connectorization and be stackable utilizing only the integral retention features to affix the clips to one another.

END OF SECTION

3.2.13 27 13 23.60 Infrastructure Optical Performance

A. General Specifications
   1. All products shall meet the requirements of this optical performance specification.

B. Cabling shall meet the performance specifications as stated below in Table 9.

Table 9: Bulk Cable Optical Performance

Optical Fiber Type	62.5 um MM	50um MM	50 um MM	50 um MM	Single-mode
ISO/IEC 11801 Nomenclature	OM1	OM2	OM3	OM4	OS2
Wavelength (nm)	850/1300	850/1300	850/1300	850/1300	1310/1383/1550
Minimum OFL Bandwidth (MHz•km)	200 / 500	700 / 500	1500 / 500	3500 / 500	-/-/-
Maximum Attenuation (dB/km)	3.4/1.0	3.0/1.0 2.8/1.0*	3.0/1.0 2.8/1.0*	3.0/1.0 2.8/1.0*	0.4/0.4/0.3 (LT/Ribbon) 0.65/0.65/0.5 (TB)
Minimum Effective Modal Bandwidth (MHz•km)	220 / -	950 / -	2000 / -	4700 / -	-/-/-
Serial 1GbE Distance (m)	300 / 550	750 / 600	1000 / 600	1100 / 600	5000 / - / -
Serial 10GbE Distance (m)	up to 33	up to 150	up to 300	up to 550	up to 550

* The following cables offer this improved attenuation performance: MIC, FREEDM One, FREEDM Fan-out, single-fiber and 2-fiber zipcord cables

C. Pre-terminated optical fiber systems shall meet the following performance specifications.
   1. OM3 and OM4 Trunk Assemblies shall meet 0.75 ns skew (maximum) at a distance up to 300 meters
   2. OM3 and OM4 Trunk Assemblies shall support 40/100G as stated in IEEE802.3
   3. All components shall meet the maximum insertion loss values indicated in Table 10.

Table 10: Components Optical Specifications

Product Type	Insertion Loss, max (dB)	Bend Optimized OM3 and OM4 50um		Bend Optimized Single-Mode
High Density System	MTP® mated pair loss	0.35		0.75
	LC mated pair loss	0.15		0.5
	Module Loss	0.5		1.3
		Standard Loss	Low Loss	
Standard Density System	MTP® mated pair loss	0.5	0.35	0.75
	LC mated pair loss	0.25	0.15	0.5
	Module Loss	0.75	0.5	1.3

END OF SECTION

3.2.14 27 13 23.65 Polarity Management

A. General Specifications
    1. All components in both the high-density and standard-density pre-terminated systems shall be manufactured such that transmit to receive polarity is managed when components are mated together, and polarity management method shall allow for concatenation of multiple components.
B. All MTP connectors shall mate key-up to key-down
C. The solution(s) shall not utilize any of the following techniques to achieve polarity management:
    1. Pair-wise flips within the trunk assembly
    2. "A" and "B" patchcords in the system (one straight through and one with a pairwise flip) or flip of patchcords in the field during installation
    3. "A" & "B" modules and/or harnesses (one module/harness straight through and one with pairwise flips)
    4. "A" and "B" installation orientation (modules and/or harnesses installed in one position at one end of the system and in a physically opposite orientation/position at the other end of the system)

END OF SECTION

3.2.15 26 27 00 Low-Voltage Distribution Equipment

3.2.15.1 26 27 26 Wiring Devices

A. The network power solution shall be able to handle the internal termination of composite copper DC power and optical fiber cable without the use of third-party components.

3.2.15.2 26 27 33 Power Distribution Units

3.2.15.2.1 26 27 33.00.13 Network Power Supplies

A. If allowed by the design, powered equipment included in this specification may be powered locally from assigned UPS/PDU outlets via cords and/or power supplies provided by the original equipment manufacturer (OEM). All other power must be supplied through one or more of the powering solutions below, using the recommended guidelines.
    1. Powered devices may receive their DC power from intermediate or centralized shelves. These shelves must contain the passive interconnect hardware (for connecting the horizontal cabling to the riser cabling) and provide DC power. Alternatively, the shelves may receive their DC power from separate passive hardware and commercially available fuse panels.
    2. The intermediate centralized shelf shall have the following characteristics:
        a. Power input: 100-240 VAC, 50-60 Hz power, Maximum input current at 85 VAC is 16.8 amp with fully loaded 6 Power Supply Modules (PSMs).
        b. Output: 12 DC ports – 57 VDC, 1.7 amp each, maximum 60 V (UL limit)
        c. Physical characteristics
            1. Mounting: Rack mount – 19 in 1U
            2. Dimensions (H x W x D): 17 x 15 x 19.2 in (430.5 x 379.8 x 488 mm)
            3. Weight: 5.5 lb (2.5 kg) – without PSM
    3. Bulk power distribution
        a. Shall consist of a transmitter and receiver that delivers power according to device requirements
        b. Pulsed power transfer w/fault detection
        c. Class 3 Power Supply
        d. Complies with NEC 830.15 and IEC/UL 60950-1, -21 (RFT-V Circuits)
        e. Shall perform fault detection test periodically, shutting down power until the fault is removed.
        f. RX Characteristics
            1. Bridge-mode (for universal mains 90-240VDC)
            2. IP65 Enclosure
            3. Convection Cooled
            4. Op. Temp. Range -20 to 104°F (-29 to 40°C)
        g. Distance and AWG – specify the power/distance/maximum wire size combination for the project or for generic reference, include a chart
        h. GUI supports line card monitoring, alarming and control
        i. TX to RX transport efficiency of at least 95%

END OF SECTION

4 APPENDIX

4.1 APPENDIX 1: APPROVED PRODUCT MANUFACTURERS

The following Product Manufacturers are approved for the City of Long Beach Structured Cabling System (SCS) to support all Telecommunications, and Information Communication Technology (ICT) infrastructure.

Substitutions will not be accepted without written approval by the City of Long Beach Telecommunications Division representative.

A. COMMSCOPE SYSTIMAX
B. CORNING
C. Chatsworth Products Inc (CPI)
D. Panduit
E. Cooper B-Line
F. CADDY
G. HILTI

4.2 Appendix 2: CommScope Part Numbers

4.2.1 Data Communications Horizontal Cabling (Category 6/Class E)

a. Approved Manufacturer: CommScope SYSTIMAX GigaSPEED XL CAT6

PLENUM	
Product #	Material ID
2071E LB 4/23 W1000	760191833
2071E BL 4/23 W1000	700208093
2071E WH 4/23 W1000	700208101
2071E YL 4/23 W1000	700210123
2071E SL 4/23 W1000	700214372
2071E OR 4/23 W1000	700210024
2071E LL 4/23 W1000	700210214
2071E RD 4/23 W1000	700210263
2071E BK 4/23 W1000	700210230
2071E SG 4/23 W1000	700210164

NON-PLENUM	
Product #	Material ID
1071E LB 4/23 W1000	700211964
1071E BL 4/23 W1000	760004689
1071E WH 4/23 W1000	700212046
1071E YL 4/23 W1000	700211998
1071E SL 4/23 W1000	700211931
1071E OR 4/23 W1000	700212103
1071E LL 4/23 W1000	700212095
1071E RD 4/23 W1000	700212020
1071E BK 4/23 W1000	700212129
1071E SG 4/23 W1000	700212061

b. Approved Manufacturer: CommScope CS34P I/O

CS34P-IO (874049304/10) Category 6 U/UTP 4/23 Indoor/Outdoor, BLACK

c. Approved Manufacturer: CommScope SYSTIMAX OSP CAT6

1571A BK 4/24 R1000 (760008888) Category 6 GigaSPEED XL® U/UTP OSP, BLACK
1571A BK 4/24 R3000 (760090043) Category 6 GigaSPEED XL® U/UTP OSP, BLACK
1572A BK 4/24 R1000 (760170886) Category 6 GigaSPEED XL® F/UTP OSP, BLACK

4.2.2 Data Communications Horizontal Cabling (Category 6A/Class EA)

a. Approved Manufacturer: CommScope SYSTIMAX GigaSPEED X10D

PLENUM	
Product #	Material ID
2091B LB 4/23 W1000	760154039
2091B BL 4/23 W1000	760107201
2091B WH 4/23 W1000	760107268
2091B YL 4/23 W1000	760107276
2091B SL 4/23 W1000	760107250
2091B OR 4/23 W1000	760107227
2091B PK 4/23 W1000	760118497
2091B RD 4/23 W1000	760107243
2091B BK 4/23 W1000	760185900
2091B GR 4/23 W1000	760107219

NON-PLENUM	
Product #	Material ID
1091B LB 4/23 W1000	760107102
1091B BL 4/23 W1000	760107094
1091B WH 4/23 W1000	760107144
1091B YL 4/23 W1000	760107151
1091B SL 4/23 W1000	760107078
1091B OR 4/23 W1000	760107128
1091B PK 4/23 W1000	760188276
1091B RD 4/23 W1000	760107136
1091B BK 4/23 W1000	760107086
1091B GR 4/23 W1000	760107110

b. Approved Manufacturer: CommScope CS44P I/O

CS44P-IO (874036404/10) Category 6A U/UTP 4/23 Indoor/Outdoor, BLACK

c. Approved Manufacturer: CommScope SYSTIMAX OSP F/UTP CAT6A

1592A BK 4/24 R1000 (760178129) 1592A Category 6A F/UTP Cable, outdoor, black jacket, aluminum tape

4.2.3 Category 5 Enhanced (5e)/Class D Outlets

a. Approved Manufacturer: CommScope SYSTIMAX

Color	Single	
Blue	MPS100E-318	108232778
Yellow	MPS100E-123	108232711

Color	Single	
Green	MPS100E-226	108232729
Ivory	MPS100E-246	108232737

Gray	MPS100E-270	108232752
White	MPS100E-262	108232745
Orange	MPS100E-112	108232703

Violet	MPS100E-361	108337726
Red	MPS100E-317	108232760
Black	MPS100E-003	108232695

4.2.4 Category 6/Class E Outlets

Approved Manufacturer: CommScope SYSTIMAX

Color	Single	
Blue	MGS400-318	700206758
Yellow	MGS400-123	700206691
Gray	MGS400-270	700206733
White	MGS400-262	700206725
Orange	MGS400-112	700206683
Almond	MGS400-148	760074211

Color	Single	
Green	MGS400-226	700206709
Ivory	MGS400-246	700206717
Violet	MGS400-361	700206675
Red	MGS400-317	700206741
Black	MGS400-003	700206667
Cream	MGS400-215	760070326

4.2.5 Category 6 Augmented (6A)/Class EA Outlets

a. Approved Manufacturer: CommScope SYSTIMAX

Color	Single	
Blue	MGS600-318	760092452
Yellow	MGS600-123	760092387
Gray	MGS600-270	760092437
White	MGS600-262	760092429
Orange	MGS600-112	760092379
Almond	MGS600-148	760092478

Color	Single	
Green	MGS600-226	760092403
Ivory	MGS600-246	760092411
Violet	MGS600-361	760092460
Red	MGS600-317	760092445
Black	MGS600-003	760092361
Cream	MGS600-215	760092395

4.2.6 Faceplates and Surface Mount Boxes (SMB)

a. Approved Manufacturer: CommScope (Following Catalog Number/Part numbers are provided as examples, see CommScope representative for assistance in selecting the proper faceplates and SMBs)

Faceplate physical specifications

Product number	Port configuration	Port quantity	Port orientation	Box gang quantity	Available styles
Flush mounted modular faceplates—flat edge LE Series					
M10LE	simplex	1	NA	1	black
M12LE	duplex	2	horizontal	1	creme
M13LE	triplex	3	vertical	1	ivory
M14LE	quadplex	4	square	1	white
M16LE	sixplex	6	vertical	1	gray
Flush mounted modular faceplates—beveled edge L Series					
M10L	simplex	1	NA	1	black
M12L	duplex	2	horizontal	1	electrical ivory
M13L	triplex	3	vertical	1	electrical white
M14L	quadplex	4	square	1	electrical gray
M16L	sixplex	6	vertical	1	
M28L	eightplex	8	horizontal	2	
M10LW	(wall phone) simplex	1	NA	1	electrical ivory
M10LW	(wall phone) simplex	1	NA	1	electrical white
M12AP	duplex	2	vertical	1	electrical ivory
M12AP	duplex	2	vertical	1	electrical white
Flush mounted modular faceplates—flat edge M Series					
M13FP	single gang frame	NA	NA	1	black
M26FP	double gang frame	NA	NA	2	ivory
M30FP-1RJ45	single port adapter	1	NA	NA	white
M30FP-2RJ45	double port adapter	2	horizontal	NA	gray
M30FP-SVHS	flush mount S-VHS adapter	1	NA	NA	
M30FP-3RCA	3-port RCA adapter	3	horizontal	NA	
M30FP-VGA-PT	VGA adapter	1	NA	NA	
M30FP-BLANK	blank adapter	blank	NA	NA	
Flush mounted modular faceplates—stainless steel					
M12SP	duplex	2	horizontal	1	brushed stainless steel
M13SP	triplex	3	vertical	1	
M14SP	quadplex	4	square	1	
M16SP	sixplex	6	vertical	1	
M30CC	simplex	1	MN	NA	ivory

4.2.7 Dust Covers for Faceplates

a. Approved Manufacturer: CommScope
b. (Following Catalog Number/Part numbers are provided as examples, see CommScope representative for assistance in selecting the proper faceplates)

M20AP-246 107067860 Ivory cover for empty faceplate openings

M21A-246 108066457 Ivory cover for unpopulated jacks

4.2.8 Category 6 /Class E Patch Cords

1. Approved Manufacturer: CommScope
   (The following Catalog/Part numbers are shown as examples, contact your CommScope Representative to specify correct Catalog/Part numbers)

A. CommScope Portfolio Reduced Diameter Patch Cords

Color	Product #	Material ID
Blue	**MINO6-BL**	CO166S2-0ZFxxx
White	**MINO6-WH**	CO166S2-08Fxxx
Yellow	**MINO6-YL**	CO166S2-09Fxxx
Dark Gray	**MINO6-DG**	CO166S2-03Fxxx
Spring Green	**MINO6-SG**	CO166S2-04Fxxx
Orange	**MINO6-OR**	CO166S2-06xxx
Purple	**MINO6-PR**	CO166S2-0Lxxx
Red	**MINO6-RD**	CO166S2-07xxx
Black	**MINO6-BK**	CO166S2-01xxx
Light Blue	**MINO6-LB**	CO166S2-02xxx

B. CommScope SYSTIMAX Standard Patch Cords

Color	Product #	Material ID
Blue	**GS8E-BL**	CPC3312-0ZFyyy
White	**GS8E-WH**	CPC3312-08Fyyy
Yellow	**GS8E-YL**	CPC3312-09Fyyy
Dk. Gray	**GS8E-DG**	CPC3312-03Fyyy
Green	**GS8E-GN**	CPC3312-04Fyyy
Color	Product #	Material ID
Orange	**GS8E-OR**	CPC3312-06Fyyy
Lilac	**GS8E-LL**	CPC3312-0BFyyy
Red	**GS8E-RD**	CPC3312-07Fyyy
Black	**GS8E-BK**	CPC3312-01Fyyy
Lt. Blue	**GS8E-LB**	CPC3312-02Fyyy

C. CommScope Ceiling Connector Assembly (CCA) for CAT6 UTP MPTL Links

Material ID	Product Number	

		Environmental Space
760235585	CCA-GS8E-LSZH-BLACK-N018	LSZH
760235586	CCA-GS8E-LSZH-WHITE-N018	LSZH
760235587	CCA-GS8E-PLENUM-BLACK-N018	Plenum
760235588	CCA-GS8E-PLENUM-WHITE-N018	Plenum
760234921	Ceiling Connector Assembly (CCA) without cordage	Plenum/LSZH

4.2.9 Category 6 Augmented (6A)/Class EA Patch Cords

1. Approved Manufacturer: CommScope
   (The following Catalog/Part numbers are shown as examples, contact your CommScope Representative to specify correct Catalog/Part numbers)

   A. CommScope Portfolio Reduced Diameter Patch Cords

Color	Product #	Material ID
Blue	**MiNo6A-BL**	CO199K2-0ZFyyy
White	**MiNo6A-WH**	CO199K2-08Fyyy
Yellow	**MiNo6A-YL**	CO199K2-09Fyyy
Dark Gray	**MiNo6A-DG**	CO199K2-03Fyyy
Spring Green	**MiNo6A-SG**	CO199K2-04Fyyy

Orange	**N/A**	**N/A**
Purple	**MiNo6A-VL**	CO199K2-0LFyyy
Red	**MiNo6A-RD**	CO199K2-07Fyyy
Black	**MiNo6A-BK**	CO199K2-01Fyyy
Light Blue	**MiNo6A-LB**	CO199K2-02Fyyy

   B. CommScope SYSTIMAX X10D CAT6A Standard Patch Cords

Color	Product #	Material ID
Blue	**360GS10E-BL**	CPCSSX2-0ZFyyy
White	**360GS10E-WH**	CPCSSX2-08Fyyy
Yellow	**360GS10E-YL**	CPCSSX2-09Fyyy
Dk. Gray	**360GS10E-DG**	CPCSSX2-03Fyyy
Green	**360GS10E-GN**	CPCSSX2-04Fyyy
Slate	**360GS10E-SL**	CPCSSX2-0CFyyy

Color	Product #	Material ID
Orange	**360GS10E-OR**	CPCSSX2-06Fyyy
Lilac	**360GS10E-LL**	CPCSSX2-0BFyyy
Red	**360GS10E-RD**	CPCSSX2-07Fyyy
Black	**360GS10E-BK**	CPCSSX2-01Fyyy
Lt. Blue	**360GS10E-LB**	CPCSSX2-02Fyyy

C. CommScope Ceiling Connector Assembly (CCA) for CAT6A UTP MPTL Links

Material ID	Product Number	Environmental Space
760235589	CCA-GS10E-LSZH-BLACK-N018	LSZH
760235590	CCA-GS10E-LSZH-WHITE-N018	LSZH
760235591	CCA-GS10E-PLENUM-BLACK-N018	Plenum
760235592	CCA-GS10E-PLENUM-WHITE-N018	Plenum
760234921	Ceiling Connector Assembly (CCA) without cordage	Plenum/LSZH

4.2.10 Patch Panels

A. Category 5e/Class D Patch Panels

a. CommScope SYSTIMAX Patch Panels

Category 5e Universal Panels CPP-5E-DM-1U-24 (760180000)

Catefory 5e Universal Panels 1100-U-PS-24 (760182907)

Category 5e Universal Panels CPP-5E-DM-2U-48 (760180018)

Catefory 5e Universal Panels 1100-U-PS-48 (760182915)

B. Category 6/Class E Patch Panels

a. CommScope SYSTIMAX Patch Panels

360-IPR-1100-E-GS3-1U-24 (760152561) GigaSPEED XL Cat 6 U/UTP, 24 port

360-IPR-1100-E-GS3-2U-48 (760152579) GigaSPEED XL Cat 6 U/UTP, 48 port

b. CommScope SYSTIMAX Angled Patch Panels

360-IPR-1100A-E-GS3-1U-24 (760151308) GigaSPEED XL Angled Cat 6 U/UTP, 24 port

360-IPR-1100A-E-GS3-2U-48 (760151753) GigaSPEED XL Angled Cat 6 U/UTP, 48 port

C. Category 6A/Class EA Patch Panels

a. CommScope SYSTIMAX Patch Panels

360-IPR-1100-E-GS6-1U-24 (760152587) GigaSPEED X10D Category 6A U/UTP, 24 port
360-IPR-1100-E-GS6-2U-48 (760152595) GigaSPEED X10D Category 6A U/UTP, 48 port

b. CommScope SYSTIMAX Angled Patch Panels

360-IPR-1100A-E-GS6-1U-24 (760151324) GigaSPEED X10D Ang CAT 6A U/UTP, 24 port
360-IPR-1100A-E-GS6-2U-48 (760151779) GigaSPEED X10D Ang CAT 6A U/UTP, 48 port

D. High Density CAT6A and CAT6 Modular Patch Panels

a. CommScope Patch Panel

M4800-1U-GS (760105429) 1U Modular Panel, 48 port, CAT 6A and 6 Info Outlets
M2400-1U-GS (760118323) 1U Modular Panel, 24 port, CAT 6A and 6 Info Outlets

b. CommScope Blank Modular CAT6 and CAT6A Panels

360-E-MOD-2U-48 (760187195) 2U SYSTIMAX 360™ Evolve 48-port flat panel
360-E-MOD-1U-24 (760187187) 1U SYSTIMAX 360™ Evolve 24-port flat panel

4.3 Appendix 3: Corning Part Numbers:

4.3.1 FREEDM® One Tight-Buffered Cables, Riser

Mechanical Characteristics Cable						
Fiber Count	Nominal Outer Diameter	Max. Tensile Strength, Short-Term	Max. Tensile Strength, Long-Term	Min. Bend Radius Instal-lation	Min. Bend Radius Ope-ration	Weight
2	5.2 mm (0.20 in)	675 N (150 lbf)	200 N (45 lbf)	78 mm (3.1 in)	52 mm (2.0 in)	20.5 kg/km (13.8 lb/1000 ft)
4	5.5 mm (0.22 in)	675 N (150 lbf)	200 N (45 lbf)	83 mm (3.2 in)	55 mm (2.2 in)	23.7 kg/km (15.9 lb/1000 ft)
6	5.5 mm (0.22 in)	675 N (150 lbf)	200 N (45 lbf)	83 mm (3.2 in)	55 mm (2.2 in)	25.7 kg/km (17.3 lb/1000 ft)
12	6.5 mm (0.26 in)	675 N (150 lbf)	200 N (45 lbf)	98 mm (3.8 in)	65 mm (2.6 in)	35.6 kg/km (23.9 lb/1000 ft)
18	7.4 mm (0.29 in)	1350 N (300 lbf)	400 N (90 lbf)	111 mm (4.4 in)	74 mm (2.9 in)	48.5 kg/km (32.6 lb/1000 ft)
24	8.0 mm (0.31 in)	1350 N (300 lbf)	400 N (90 lbf)	120 mm (4.7 in)	80 mm (3.1 in)	57.1 kg/km (38.4 lb/1000 ft)

4.3.1.1 Transmission Performance

Multimode					
Fiber Core Diameter (µm)	62.5	50	50	50	50
Fiber Category	OM1	OM2	OM3	OM4	OM4 Extended Distance
Fiber Code	K	T	T	T	T
Performance Option Code	30	31	80	90	91
Wavelengths (nm)	850/1300	850/1300	850/1300	850/1300	850/1300
Maximum Attenuation (dB/km)	3.4/1.0	2.8/1.0	2.8/1.0	2.8/1.0	2.8/1.0
Serial 1 Gigabit Ethernet (m)	300/550	750/600	1000/600	1000/600	1100/600
Serial 10 Gigabit Ethernet (m)	33/-	150/-	300/-	550/-	600/-
Min. Overfilled Launch (OFL) Bandwidth (MHz·km)	200/500	700/500	1500/500	3500/500	3500/500
Minimum Effective Modal Bandwidth (EMB) (MHz·km)	220/-	950/-	2000/-	4700/-	5350/-

Single-mode		
Fiber Name	SMF-28e® fiber	SMF-28® Ultra fiber
Fiber Category	G.652.D	G.652.D/G.657.A1
Fiber Code	E	Z
Performance Option Code	31	31
Wavelengths (nm)	1310/1383/1550	1310/1383/1550
Maximum Attenuation (dB/km)	0.65/0.65/0.50	0.65/0.65/0.50

4.3.2 MIC® 250 Distribution Cables, 12-144 Fibers

Mechanical Characteristics Cable				
Fiber Count	Nominal Outer Diameter	Min. Bend Radius Installation	Min. Bend Radius Operation	Weight
12	4.4 mm (0.17 in)	66 mm (2.6 in)	22 mm (0.9 in)	20.1 kg/km (13.5 lb/1000 ft)
24 - 36	9.0 mm (0.35 in)	135 mm (5.3 in)	90 mm (3.5 in)	70 kg/km (47.04 lb/1000 ft)
48	10.0 mm (0.40 in)	150 mm (5.9 in)	100 mm (3.9 in)	88.6 kg/km (59.5 lb/1000 ft)
72	12.0 mm (0.48 in)	180 mm (7.1 in)	120 mm (4.7 in)	132 kg/km (88.7 lb/1000 ft)
96	14.2 mm (0.56 in)	213 mm (8.4 in)	142 mm (5.6 in)	190.1 kg/km (127.9 lb/1000 ft)
144	15.8 mm (0.62 in)	237 mm (9.3 in)	158 mm (6.2 in)	214.4 kg/km (144.3 lb/1000 ft)

4.3.2.1 Transmission Performance

Multimode					
Fiber Core Diameter (µm)	62.5	50	50	50	50
Fiber Category	OM1	OM2	OM3	OM4	OM4 Extended Distance
Fiber Code	K	T	T	T	T
Performance Option Code	30	31	80	90	91
Wavelengths (nm)	850/1300	850/1300	850/1300	850/1300	850/1300
Maximum Attenuation (dB/km)	3.4/1.0	3.0/1.0	3.0/1.0	3.0/1.0	3.0/1.0
Serial 1 Gigabit Ethernet (m)	300/550	750/500	1000/600	1100/600	1100/600
Serial 10 Gigabit Ethernet (m)	33/-	150/-	300/-	550/-	600/-
Min. Overfilled Launch (OFL) Bandwidth (MHz*km)	200/500	700/500	1500/500	3500/500	3500/500
Minimum Effective Modal Bandwidth (EMB) (MHz*km)	220/-	950/-	2000/-	4700/-	5350/-

Single-mode			
Fiber Name	Single-mode (OS2)	CleanCurve® ZBL	SMF-28® Ultra fiber
Fiber Category	G.652.D	G.657.B3/G.652.D	G.657.A1
Fiber Code	E	U	Z
Performance Option Code	01	01	01
Wavelengths (nm)	1310/1383/1550	1310/1383/1550	1310/1383/1550
Maximum Attenuation (dB/km)	0.4/0.4/0.3	0.4/0.4/0.3	0.4/0.4/0.3
Typical Attenuation* (dB/km)	-	0.35/0.35/0.20	0.33/0.33/0.19

4.3.3 ActiFi™ Composite Cable, Loose Tube, Indoor/Outdoor, FREEDM® Riser 2 F, 2 Cu Conductor, 16AWG

A. Part Number:

1. 002ZTF-21Y01M20

Mechanical Specifications	
Min. Bend Radius Installation	91.44 mm (3.6 in)
Min. Bend Radius Operation	60.96 mm (2.4 in)
Nominal Outer Diameter	6.1 mm (0.24 in)

Cable Design

Central Element	Jacketed GRP
Fiber Count	2
Buffer Tube Color Coding	Yellow
Number of Ripcords	1
Outer Jacket Color	Black
Outer Jacket Material	Flame-retardant
Buffer Tube Color	Yellow
Buffer Tube Diameter	1.6 mm (0.06 in)
Conductor	16 AWG
Number of Active Tubes	1
Number of Conductors	2
Number of Tube Positions	1
Fiber Coloring	Blue, Orange
Fibers per Tube	2

General Specifications	
Environment	Indoor/Outdoor
Cable Type	Loose Tube
Fiber Category	SMF-28® Ultra fiber
Application	Vertical Riser
Optical Characteristics	
Fiber Code	Z
Fiber Name	SMF-28® Ultra fiber
Fiber Type	Single-mode
Performance Option Code	01
Maximum Attenuation	0.4 dB/km / 0.4 dB/km / 0.3 dB/km
Wavelengths	1310 nm / 1383 nm / 1550 nm
Fiber Category	ITU-TG.657.A1

B. Composite Cable Ordering List

→ Selection Parameters →							← Output Information →						
Voltage Rating	Cable Type/ App	Conductor Count (# Cond.)	Conductor Size (AWG)	Fiber Count (ea)	Construction TB/LT	Part Number	Diameter (mm/in)	Weight (lb/1kft)	Minimum Bend Radius		MOQ (ft)	Maximum Production Length (ft)	Lead Time (weeks)
									Installing (in)	Installed (in)			
300 VAC	Indoor Plenum (CL3P)	2	20	1F	TB	XXXZ48-2IZ3IM29	4.8 / 0.19	21.64	2.85	1.90	1182.00	9842.00	2 wks
				2F			5.2 / 0.20	23.45	3.00	2.00	1182.00	9842.00	
				4F			5.3 / 0.21	25.27	3.15	2.10	1182.00	9842.00	
				6F			6.3 / 0.25	29.70	3.75	2.50	1182.00	9842.00	
		4		2F		XXXZ48-4IZ3IM29	5.6 / 0.22	32.93	3.30	2.20	1182.00	9842.00	4-6 wks
				4F			6.4 / 0.25	37.97	3.75	2.50	1182.00	9842.00	
				6F			7.0 / 0.28	39.91	4.20	2.80	1182.00	9842.00	
		2	18	1F		XXXZ48-2IV3IM29	5.2 / 0.20	26.61	3.00	2.00	1182.00	9842.00	4-6 wks
				2F			5.6 / 0.22	28.49	3.30	2.00	1182.00	9842.00	
				4F			6.0 / 0.24	31.11	3.60	2.40	1182.00	9842.00	
				6F			6.7 / 0.26	34.67	3.90	2.60	1182.00	9842.00	
		4		2F		XXXZ48-4IV3IM29	6.3 / 0.25	42.67	3.75	2.50	1182.00	9842.00	4-6 wks
				4F			7.1 / 0.28	46.50	4.20	2.80	1182.00	9842.00	
				6F			7.7 / 0.30	49.59	4.50	3.00	1182.00	9842.00	
		2	16	1F		XXXZ68-2IY3IM29	6.6 / 0.26	30.78	3.90	2.60	1182.00	4839.00	2 wks
				2F			6.9 / 0.27	41.73	4.05	2.70	1182.00	4839.00	
		2	20	2/4/6/8/12F	LT	XXXZT8-2IZ0IM20	5.8 / 0.23	26.66	3.45	2.30	1182.00	9842.00	4-6 wks
		4		2/4/6/8/12F		XXXZT8-4IZ0IM20	6.4 / 0.25	36.69	3.75	2.50	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZT8-6IZ0IM20	7.0 / 0.28	45.65	4.20	2.80	1182.00	9842.00	
		12		6/12/24F		XXXZT8-MIZ0IM20	9.3 / 0.37	90.29	5.55	3.70	1182.00	9842.00	
		2	18	2/4/6/8/12F		XXXZT8-2IV0IM20	6.2 / 0.24	27.54	3.60	2.40	1182.00	9842.00	4-6 wks
		4		4/6/8/12F		XXXZT8-4IV0IM20	6.9 / 0.27	45.07	4.05	2.70	1182.00	9842.00	
				24F			7.4 / 0.29	47.27	4.35	2.90	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZT8-6IV0IM20	7.3 / 0.28	58.01	4.20	2.80	1182.00	9842.00	
				24F			8.7 / 0.34	70.03	5.10	3.40	1182.00	9842.00	
		12		6/12/24F		XXXZT8-MIV0IM20	10.0 / 0.39	113.93	5.85	3.90	1182.00	9842.00	
		2	16	2/4/6/8/12F		XXXZT8-2IY0IM20	6.6 / 0.26	34.74	3.90	2.60	1182.00	4839.00	2 wks
		4		4/6/8/12F		XXXZT8-4IY0IM20	7.3 / 0.29	59.09	4.35	2.90	1182.00	4839.00	4-6 wks
				24F			7.8 / 0.31	60.56	4.65	3.10	1182.00	4839.00	
		6		2/4/6/8/12F		XXXZT8-6IY0IM20	7.6 / 0.30	78.38	4.50	3.00	1182.00	4839.00	
				24F			9.0 / 0.35	90.70	5.25	3.50	1182.00	4839.00	
		12		6/12/24F		XXXZT8-MIY0IM20	11.2 / 0.44	157.53	6.60	4.40	1182.00	4839.00	

→ Selection Parameters →						← Output Information →						
Voltage Rating	Cable Type/ App	Conductor Count (# Cond.)	Conductor Size (AWG)	Fiber Count (ea)	Construction TB, LT	Part Number	Diameter (mm/in)	Weight (lb/1kft)	Minimum Bend Radius		MOQ (ft)	Maximum Production Length (ft)	Lead Time (weeks)
									Installing (in)	Installed (in)			
300 VAC	Indoor Plenum (CL3P)	2	14	4/6/8/12F	LT	XXXZD8-21X01M20	8.3 / 0.33	58.47	4.95	3.30	1182.00	2411.00	4-6 weeks
				24F			9.1 / 0.36	67.38	5.40	3.60	1182.00	2411.00	
		4		2/4/6/8/12F		XXXZD8-41X01M20	9.5 / 0.38	93.47	5.70	3.80	1182.00	2411.00	
				24F			10.5 / 0.41	101.87	6.15	4.10	1182.00	2411.00	
		6		2/4/6/8/12F		XXXZD8-61X01M20	11.2 / 0.44	142.35	6.60	4.40	1182.00	2411.00	
				24F			12.5 / 0.49	154.24	7.35	4.90	1182.00	2411.00	
		12		6/12/24F		XXXZD8-M1X01M20	14.0 / 0.55	254.04	8.25	5.50	1182.00	2411.00	
		2	12	2/4/6/8/12F		XXXZD8-21W01M20	10.3 / 0.41	100.95	6.15	4.10	1182.00	2033.00	
				24F			11.5 / 0.45	112.56	6.75	4.50	1182.00	2033.00	
		4		2/4/6/8/12F		XXXZD8-41W01M20	11.0 / 0.43	152.27	6.45	4.30	1182.00	2033.00	
				24F			12.0 / 0.47	163.01	7.05	4.70	1182.00	2033.00	
		6		2/4/6/8/12F		XXXZD8-61W01M20	12.0 / 0.47	205.35	7.05	4.70	1182.00	2033.00	
				24F			13.0 / 0.51	216.14	7.65	5.10	1182.00	2033.00	
		12		6/12/24F		XXXZD8-M1W01M20	16.0 / 0.63	375.14	9.45	6.30	1182.00	2033.00	
	FREEDM* Riser: Indoor/ Outdoor (CL3R)	2	20	2/4/6/8/12F		XXXZTF-21Z01M20	5.3 / 0.21	22.22	3.15	2.10	1182.00	9842.00	2 weeks
		4		2/4/6/8/12F		XXXZTF-41Z01M20	6.0 / 0.24	34.83	3.60	2.40	1182.00	9842.00	4-6 weeks
		6		2/4/6/8/12F		XXXZTF-61Z01M20	6.9 / 0.27	45.91	4.05	2.70	1182.00	9842.00	
		12		6/12/24F		XXXZTF-M1Z01M20	9.0 / 0.35	82.66	5.25	3.50	1182.00	9842.00	
		2	18	2/4/6/8/12F		XXXZTF-21V01M20	6.3 / 0.25	29.90	3.75	2.50	1182.00	9842.00	4-6 weeks
		4		2/4/6/8/12F		XXXZTF-41V01M20	7.10 / 0.28	46.13	4.20	2.80	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZTF-61V01M20	8.2 / 0.32	66.83	4.80	3.20	1182.00	9842.00	
		12		6/12/24F		XXXZTF-M1V01M20	10.0 / 0.39	110.12	5.85	3.90	1182.00	9842.00	
		2	16	2/4/6/8/12F		XXXZTF-21Y01M20	7.0 / 0.28	39.63	4.20	2.80	1182.00	4839.00	2 weeks
				24F			7.5 / 0.30	42.97	4.50	3.00	1182.00	4839.00	
		4		2/4/6/8/12F		XXXZTF-41Y01M20	7.7 / 0.30	60.77	4.50	3.00	1182.00	4839.00	4-6 weeks
		6		2/4/6/8/12F		XXXZTF-61Y01M20	8.7 / 0.34	89.99	5.10	3.40	1182.00	4839.00	
		12		6/12/24F		XXXZTF-M1Y01M20	11.2 / 0.44	152.83	6.60	4.40	1182.00	4839.00	
		2	14	2/4/6/8/12F		XXXZDF-21X01M20	8.0 / 0.31	58.13	4.65	3.10	1182.00	2411.00	
				24F			8.6 / 0.34	65.92	5.10	3.40	1182.00	2411.00	
		4		4/6/8/12F		XXXZDF-41X01M20	9.9 / 0.39	95.15	5.85	3.90	1182.00	2411.00	
				24F			10.7 / 0.42	102.95	6.30	4.20	1182.00	2411.00	
		6		4/6/8/12F		XXXZDF-61X01M20	11.3 / 0.44	147.74	6.60	4.40	1182.00	2411.00	
		12		6/12/24F		XXXZDF-M1X01M20	14.2 / 0.56	247.15	8.40	5.60	1182.00	2411.00	
		2	12	2/4F		XXXZDF-21W01M20	9.0 / 0.35	83.79	5.25	3.50	1182.00	2033.00	
				6/12F		XXXZDF-21W01M20	9.0 / 0.35	89.57	5.25	3.50	1182.00	2033.00	
		4		2/4/6/8/12F		XXXZDF-41W01M20	10.9 / 0.43	137.28	6.45	4.30	1182.00	2033.00	
				24F			12.5 / 0.49	164.16	7.35	4.90	1182.00	2033.00	
		6		4/6/8F		XXXZDF-61W01M20	13.3 / 0.52	156.03	7.80	5.20	1182.00	2033.00	
				12F			13.3 / 0.52	161.63	7.80	5.20	1182.00	2033.00	
				24F			14.8 / 0.58	186.66	8.70	5.80	1182.00	2033.00	
		12		6/12F		XXXZDF-M1W01M20	17.9 / 0.70	356.08	10.50	7.00	1182.00	2033.00	
				24F			17.9 / 0.70	367.03	10.50	7.00	1182.00	2033.00	

→ Selection Parameters →							← Output Information →						
Voltage Rating	Cable Type/ App	Conductor Count (#/Cond.)	Conductor Size (AWG)	Fiber Count (ea)	Construction TB, LT	Part Number	Diameter (mm/in)	Weight (lb/1kft)	Minimum Bend Radius		MOQ (ft)	Maximum Production Length (ft)	Lead Time (weeks)
									Installing (in)	Installed (in)			
300 VAC	Armor Indoor Plenum (CL3P)	2	20	1F	TB	XXXZ48-2IZ31MA3	11.3 / 0.44	65.92	6.60	4.40	1182.00	9842.00	2 weeks
				2F			11.3 / 0.44	66.93	6.60	4.40	1182.00	9842.00	
				4F			11.3 / 0.44	68.14	6.60	4.40	1182.00	9842.00	
				6F			11.3 / 0.44	71.09	6.60	4.40	1182.00	9842.00	
		4		2F		XXXZ48-4IZ31MA3	11.3 / 0.44	73.51	6.60	4.40	1182.00	9842.00	4-6 weeks
				4F			11.3 / 0.44	76.87	6.90	4.60	1182.00	9842.00	
				6F			12.4 / 0.49	83.79	7.35	4.90	1182.00	9842.00	
		2	18	1F		XXXZ48-2IV31MA3	11.3 / 0.44	69.28	6.60	4.40	1182.00	9842.00	4-6 weeks
				2F			11.3 / 0.44	70.49	6.60	4.40	1182.00	9842.00	
				4F			11.8 / 0.46	75.80	6.90	4.60	1182.00	9842.00	
				6F			12.6 / 0.50	81.64	9.00	6.00	1182.00	9842.00	
		4		2F		XXXZ48-4IV31MA3	11.8 / 0.46	83.59	6.90	4.60	1182.00	9842.00	4-6 weeks
				4F			13.7 / 0.54	94.75	8.10	5.40	1182.00	9842.00	
				6F			13.7 / 0.54	96.76	8.10	5.40	1182.00	9842.00	
		2	16	1F		XXXZ68-2IY31MA3	11.3 / 0.44	72.10	6.90	4.60	1182.00	4839.00	2 weeks
				2F			12.4 / 0.49	85.00	6.90	4.60	1182.00	4839.00	
		2	20	2/4/6/8/12F	LT	XXXZT8-2IZ01MA3	11.9 / 0.47	60.19	7.05	4.70	1182.00	9842.00	4-6 weeks
		4		2/4/6/8/12F		XXXZT8-4IZ01MA3	12.4 / 0.49	105.46	7.35	4.90	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZT8-6IZ01MA3	13.0 / 0.51	117.73	7.65	5.10	1182.00	9842.00	
		12		6/12/24F		XXXZT8-MIZ01MA3	15.7 / 0.62	179.59	9.30	6.20	1182.00	9842.00	
		2	18	2/4/6/8/12F		XXXZT8-2IV01MA3	12.4 / 0.48	96.12	7.20	4.80	1182.00	9842.00	4-6 weeks
		4		4/6/8/12F		XXXZT8-4IV01MA3	13.0 / 0.51	117.06	7.65	5.10	1182.00	9842.00	
				24F			14.3 / 0.56	127.54	8.40	5.60	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZT8-6IV01MA3	14.3 / 0.56	138.82	8.40	5.60	1182.00	9842.00	
				24F			15.7 / 0.61	159.86	9.15	6.10	1182.00	9842.00	
		12		6/12/24F		XXXZT8-MIV01MA3	22.9 / 0.90	229.05	13.50	9.00	1182.00	9842.00	
		2	16	2/4/6/8/12F		XXXZT8-2IY01MA3	12.4 / 0.49	95.77	7.35	4.90	1182.00	4839.00	2 weeks
		4		4/6/8/12F		XXXZT8-4IY01MA3	13.2 / 0.52	135.69	7.80	5.20	1182.00	4839.00	4-6 weeks
				24F			14.3 / 0.56	141.22	8.40	5.60	1182.00	4839.00	
		6		2/4/6/8/12F		XXXZT8-6IY01MA3	14.3 / 0.56	160.01	8.40	5.60	1182.00	4839.00	
				24F			15.7 / 0.62	120.60	9.30	6.20	1182.00	4839.00	
		12		6/12/24F		XXXZT8-MIY01MA3	17.2 / 0.68	257.68	10.20	6.80	1182.00	4839.00	
		2	14	4/6/8/12F		XXXXD8-2IX01MA3	14.3 / 0.56	138.33	8.40	5.60	1182.00	2411.00	
				24F			15.7 / 0.62	156.15	9.30	6.20	1182.00	2411.00	
		4		2/4/6/8/12F		XXXXD8-4IX01MA3	15.7 / 0.62	182.67	9.30	6.20	1182.00	2411.00	
				24F			17.2 / 0.68	200.68	10.20	6.80	1182.00	2411.00	
		6		2/4/6/8/12F		XXXZD8-6IX01MA3	17.2 / 0.68	241.18	10.20	6.80	1182.00	2411.00	
				24F			19.4 / 0.76	178.47	11.40	7.60	1182.00	2411.00	
		12		6/12/24F		XXXZD8-MIX01MA3	21.3 / 0.84	402.11	12.60	8.40	1182.00	2411.00	

→ Selection Parameters →						← Output Information →						
Voltage Rating	Cable Type/ App	Conductor Count (# Cond.)	Conductor Size (AWG)	Fiber Count (fx)	Construction TB, LT	Part Number	Diameter (mm/in)	Weight (lb/1kft)	Minimum Bend Radius		MOQ (ft)	Maximum Production Length (ft)	Lead Time (weeks)
									Installing (in)	Installed (in)			
300 VAC	Armor FREEDM® Riser (CL3R)	2	12	2/4/6/8/12F	LT	XXXZD8-21W01MA3	17.2 / 0.68	199.78	10.20	6.80	1182.00	2033.00	4-6 weeks
				24F			17.9 / 0.70	216.20	10.50	7.00	1182.00	2033.00	
		4		2/4/6/8/12F		XXXZD8-41W01MA3	17.2 / 0.68	250.37	10.20	6.80	1182.00	2033.00	
				24F			17.9 / 0.70	284.53	10.50	7.00	1182.00	2033.00	
		6		2/4/6/8/12F		XXXZD8-61W01MA3	17.9 / 0.70	328.30	10.50	7.00	1182.00	2033.00	
				24F			19.4 / 0.76	351.44	11.40	7.60	1182.00	2033.00	
		12		6/12/24F		XXXZD8-M1W01MA3	24.3 / 0.95	543.89	14.25	9.50	1182.00	2033.00	
		2	20	2/4/6/8/12F		XXXZTF-21Z01MA1	13.1 / 0.52	89.22	7.80	5.20	1182.00	9842.00	2 weeks
		4		2/4/6/8/12F		XXXZTF-41Z01MA1	14.1 / 0.56	108.94	8.40	5.60	1182.00	9842.00	4-6 weeks
		6		2/4/6/8/12F		XXXZTF-61Z01MA1	16.0 / 0.63	129.53	9.45	6.30	1182.00	9842.00	
		12		6/12F		XXXZTF-M1Z01MA1	15.7 / 0.62	165.82	9.30	6.20	1182.00	9842.00	
				24F			15.7 / 0.62	165.15	9.30	6.20	1182.00	9842.00	
		2	18	2/4/6/8/12F		XXXZTF-21V01MA1	12.4 / 0.48	93.10	7.20	4.80	1182.00	9842.00	4-6 weeks
		4		2/4/6/8/12F		XXXZTF-41V01MA1	14.3 / 0.56	120.69	8.40	5.60	1182.00	9842.00	
		6		2/4/6/8/12F		XXXZTF-61V01MA1	15.7 / 0.61	149.76	9.15	6.10	1182.00	9842.00	
		12		6/12/24F		XXXZTF-M1V01MA1	17.2 / 0.67	202.03	10.05	6.70	1182.00	9842.00	
		2	16	2/4/6/8/12F		XXXZTF-21Y01MA1	13.1 / 0.52	102.58	7.80	5.20	1182.00	4839.00	2 weeks
				24F			13.1 / 0.52	107.77	7.80	5.20	1182.00	4839.00	
		4		2/4/6/8/12F		XXXZTF-41Y01MA1	14.1 / 0.56	130.81	8.40	5.60	1182.00	4839.00	4-6 weeks
		6		2/4/6/8/12F		XXXZTF-61Y01MA1	16.0 / 0.63	173.61	9.45	6.30	1182.00	4839.00	
		12		6/12F		XXXZTF-M1Y01MA1	17.2 / 0.68	245.54	10.20	6.80	1182.00	4839.00	
				24F			17.2 / 0.68	243.11	10.20	6.80	1182.00	4839.00	
		2	14	2/4/6/8/12F		XXXZDF-21X01MA1	14.1 / 0.56	132.22	8.40	5.60	1182.00	2411.00	
				24F			16.0 / 0.63	144.33	9.45	6.30	1182.00	2411.00	
		4		4/6/8/12F		XXXZDF-41X01MA1	16.6 / 0.65	180.11	9.80	6.54	1182.00	2411.00	
				24F			17.4 / 0.68	191.95	10.20	6.80	1182.00	2411.00	
		6		4/6/8/12F		XXXZDF-61X01MA1	17.2 / 0.68	239.64	10.20	6.80	1182.00	2411.00	
		12		6/12/24F		XXXZDF-M1X01MA1	21.3 / 0.84	363.56	12.60	8.40	1182.00	2411.00	
		2	12	2/4F		XXXZDF-21W01MA1	15.7 / 0.62	166.53	9.30	6.20	1182.00	2033.00	4-6 weeks
				6F			15.7 / 0.62	171.41	9.30	6.20	1182.00	2033.00	
				12F			15.7 / 0.62	173.44	9.30	6.20	1182.00	2033.00	
		4		2/4/6/8/12F		XXXZDF-41W01MA1	17.2 / 0.68	229.22	10.20	6.80	1182.00	2033.00	
				24F			17.9 / 0.70	260.22	10.50	7.00	1182.00	2033.00	
		6		4/6/8F		XXXZDF-61W01MA1	21.3 / 0.84	272.46	12.60	8.40	1182.00	2033.00	
				12F			21.3 / 0.84	278.05	12.60	8.40	1182.00	2033.00	
				24F			22.9 / 0.90	312.65	13.50	9.00	1182.00	2033.00	
		12		6/12F		XXXZDF-M1W01MA1	25.3 / 0.99	496.43	14.85	9.90	1182.00	2033.00	
				24F			25.3 / 0.99	507.35	14.85	9.90	1182.00	2033.00	

4.3.4 Corning Optical Network Evolution (ONE™) Solutions Six-Module DC Power Supply Unit (PSU6)

A. Ordering Information

Part Number	Product Description
PSM-I	Power Supply Module (up to six modules per PSU6)
PSU6-1U	Power Supply Unit with no PSM-I
PSU6-1PS	Power Supply Unit with one PSM-I
PSU6-2PS	Power Supply Unit with two PSM-I modules
PSU6-3PS	Power Supply Unit with three PSM-I modules
PSU6-4PS	Power Supply Unit with four PSM-I modules
PSU6-5PS	Power Supply Unit with five PSM-I modules
PSU6-6PS	Power Supply Unit with six PSM-I modules

4.3.5 Supported NIDs

Vendor	Part Number
Tellabs™	Tellabs® 709GP ONT
Zhone®	ZNID-GPON-2624P-00
Antaira®	LMP-0601G-SFP-T

END OF SECTION

City of Long Beach

411 W. Ocean Blvd.

Long Beach, CA 90802

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EXHIBIT "B"

Rates or Charges

Intelinet
building intelligent networks

December 23, 2020 #20354

Christina Sarmiento
City Long Beach
Purchasing Department
411 West Ocean Boulevard
Long Beach, Ca 90802

RE: City of Long Beach RFP TI21-008 City-wide Fiber Optic Indoor Cabling Sample Project Response

Dear Christina,

Please find below the scope of work and price quotation for the installation of data cabling for the sample project. All cabling shall be installed to the City specifications.

Intelinet is a premier cabling contractor in Southern California certified by Commscope SYSTIMAX and many other organizations such as BISCI. Please contact me regarding any questions with our proposal or our organization.

Sincerely,

Edward Fusco
Intelinet, Inc.

9106 Pulsar Court, Suite H, Corona Ca, 92883 ph 951 277 7669 fx 951 277 7609

Scope of Work

The following scope of work is from the RFP and was followed by Intelinet to develop the sample price quote.

1. Furnish and install sixty (60) dual outlets with two (2) CommScope SYSTIMAX Category 6 cabling.
2. Furnish and install five (5) dual AP drops with two (2) CommScope SYSTIMAX Category 6A cabling.
3. Furnish and install a 25-pair CAT 5E cable to be terminated at DEMARC back board with M1 66 block split-50.
4. Terminate the other end on a 24-port CAT 5E patch panel, with the last 2 pairs terminated on 24th port in a T1 configuration (Violet/Brown and Violet/Slate)
5. Furnish and install (2) CAT 6A cable to be terminated at DEMARC back board on a surface-mount jack.
6. Terminate the other end to the 24-port unloaded CAT 6A angled patch panel
7. Furnish and install one (1) new 4-post CPI cabinet with the following:
   Cable Management:
   - CPI 6-inch double sided vertical
   - Patch Panels:
   - (3) 48-port angled CAT 6
   - (1) 24-port, unloaded, angled CAT 6A
   - Provide (60) reduced diameter patch cords
   - (25) 4'
   - (25) 5'
   - (10) 7'
   - Include (60) 10' CAT6 patch cords for end devices
   - APC Smart-UPS 1500VA – network cable installed
   - APC AP7800B PDU
   - Furnish and install ladder rack & supports as designed in the plan
8. Terminate all cable runs back to the MDF/IDF.
9. Furnish and install a 4-post rack
10. Cables shall be installed in the plenum above the drop ceiling and run to the equipment rack.
11. At the station end, the cables shall be: Terminated on Gray and Blue inserts (Category 6 or 6A as required)
12. Installed with white faceplates
13. SMB for Wireless drops, as per existing conditions.
14. All cables shall be tested and labeled per The City of Long Beach Telecommunications Specification
15. Mount and connect customer-provided Cisco AP at each AP location
16. Provide a BOM with line-item parts and prevailing wage labor cost

MATERIAL DESCRIPTION	QUANTITY	UOM	MAN	PART NO.
2071 CAT6 BLUE CMP	24000	FT	SYSTIMAX	700208093
CAT 6 INSERT ORANGE	60	EA	SYSTIMAX	700206683
CAT 6 INSERT BLUE	60	EA	SYSTIMAX	700206758
CAT 6 INSERT GRAY	0	EA	SYSTIMAX	700206733
4 PORT FACE PLATE	37	EA	SYSTIMAX	108168543
2 PORT SMB WHITE	5	EA	SYSTIMAX	107984056
3 PORT FURNITURE PLATE WHITE	23	EA	SYSTIMAX	106650898
WHITE BLANK INSERTS 100 PK	2	EA	SYSTIMAX	107067928
48 PORT PATCH PANEL CAT6 ANGLED	3	EA	SYSTIMAX	760151753
F CONNECTOR INSERT	1	EA	SYSTIMAX	SYS
2091 CAT6AA22:F53 CABLE CMP GRAY	2000	FT	SYSTIMAX	760107201
6A INSERT ORANGE	20	EA	SYSTIMAX	760092379
24 PORT INSERT STYLE PATCH PANEL ANGLED	1	EA	SYSTIMAX	760151290
4 POST RACK	1	EA	CPI	15053-703
6 INCH DBLE SIDED VERT. MAN	2	EA	CPI	35521-703
2U WIRE MANAGER	2	EA	CPI	35441-702
12 INCH LADDER RACK	2	EA	CPI	10250-712
25 PAIR PLENUM	200	EA	ESSEX	ESSEX
66 BLOCK 50 PAIR	1	EA	SEIMENS	66M1-50
RG6	200	EA	UNIPRISE	UNIPRISE
RG6 F CONNECTOR	2	EA	BELDEN	BELDEN
CAT6 PATCH CORD 9 FOOT BLACK	60	EA	SYSTIMAX	CPC3312-0ZBK009
CAT6 RDC PATCH CORD 3 FOOT BLUE	25	EA	SYSTIMAX	CO166S2-0ZF003
CAT6 RDC PATCH CORD 5 FOOT BLUE	25	EA	SYSTIMAX	CO166S2-0ZF005
CAT6 RDC PATCH CORD 7 FOOT BLUE	10	EA	SYSTIMAX	CO166S2-0ZF007
CAT6A PATCH CORD 1 FOOT WHITE	10	EA	SYSTIMAX	CPCSSX2-0ZF005
CAT6A RDC PATCH CORD 5 FOOT BLUE	10	EA	SYSTIMAX	CO199K2-0ZF005
APC PDU	1	EA	APC	7800B
APC SMART UPS 1500VA	1	EA	APC	1500VA
MISC. HARDWARE, HANGERS, SUPPORTS	1	LT	ANY	ANY

Pricing is as follows:

Labor: **$ 14,330.00**
Material: **$ 28,924.00**
Total: **$ 43,254.00**

TELECOMMUNICATION TECHNICIAN $65.00 HR
PROJECT MANAGEMENT $95.00 HR

Terms and Conditions

1. Project is based upon normal working hours of 8am to 5 pm.
2. The Customer will provide access to work areas where required. Any additional hours resulting from access problems will be billed to the Customer at standard or premium rates as applicable and is not included in this quotation.
3. All conduits and pathways to be provided by others or are existing unless noted in scope.
4. Removal of left in, existing, or abandoned wire and cable are not included in this proposal unless stated in the Scope of Work section.
5. Changes in the work described herein may result in extra charges and will be performed only upon execution of a change order, which will reflect additional cost.
6. Material portion of project will be billed upon ordering. If project is longer than 30 days duration progress billings, commensurate with the work completed will be made monthly until ninety percent (90%) of the work is billed. Upon completion of all work the remaining ten percent (10%) retention will be billed. Extra charges will either be added to this proposal amount and billed as above or billed separately after the completion of the work.
7. Assumes prevailing wages TELECOMMUNICATIONS TECHNICIAN DETERMINATION.
8. Terms for the payment of all invoices are net thirty (30) days with a one and a half percent (1.5%) monthly interest charge on all past due accounts calculated on balance due. DISCOUNTED TERMS ARE AVAILABLE UPON REQUEST FOR NET 10, NET 15 AND NET 30. In the event legal action is instituted to enforce any of the terms or conditions of this proposal, the prevailing party shall be entitled to recover all attorney's fees and collection costs.
9. Change Management for additions to proposed SOW would be submitted by Intelinet, Inc. Project Manager and approved in writing by the customer before work is approved or additional material is ordered or labor commenced.
10. Proposal based on completion of entire scope of work. If scope of work is decreased cost of individual line items may increase.

Acceptance of Proposal for dated **( )**:

The signature of an Authorized Representative is required for Intelinet, Inc. Inc. to proceed with the ordering of the material and scheduling of the resources to complete the project.

_____
Authorized Representative- Sign name

_____
Authorized Representative- Print name

_____
Authorized Representative- Title

_____
Date

EXHIBIT "C"

City's Representative:

John Duplissis

(562) 570-7176

EXHIBIT "D"

Materials/Information Furnished: None

EXHIBIT "E"

Consultant's Key Employee:

Edward Fusco