

**PROFESSIONAL SERVICES AGREEMENT BETWEEN
FIBER OPTIC MANAGEMENT L.L.C. D/B/A TURNKEY NETWORK SOLUTIONS
AND THE CITY OF ANN ARBOR
FOR ON-DEMAND FIBER OPTIC NETWORK MAINTENANCE**

This agreement ("Agreement") is between the City of Ann Arbor, a Michigan municipal corporation, having its offices at 301 E. Huron St. Ann Arbor, Michigan 48104 ("City"), and Fiber Optic Management L.L.C. d/b/a Turnkey Network Solutions ("Contractor"), a Michigan Limited Liability Company, with its address at 7020 Southbelt Drive SE, Caledonia, MI 49316. City and Contractor are referred to collectively herein as the "Parties." The Parties agree as follows:

I. DEFINITIONS

Administering Service Area/Unit means City Administration / Information Technology.

Contract Administrator means Tom Shewchuk, acting personally or through any assistants authorized by the Administrator/Manager of the Administering Service Area/Unit.

Deliverables means all Plans, Specifications, Reports, Recommendations, and other materials developed for and delivered to City by Contractor under this Agreement.

Project means On-Demand Fiber Optic Network Maintenance, as more fully described in Exhibit A.

II. DURATION

Contractor shall commence performance on _____ ("Commencement Date") and shall remain in effect until June 30, 2027 ("Term") with the option to renew for an additional five (5) years ("Renewal Term") upon written agreement of the Parties. This Agreement shall remain in effect throughout the Term and Renewal Term, if applicable, unless terminated as provided for in Article XI. The terms and conditions of this Agreement shall apply to the earlier of the Effective Date or Commencement Date.

III. SERVICES

- A. Contractor agrees to provide On-Demand Fiber Optic Network Maintenance in connection with the Project as described in Exhibit A and pursuant to the specifications as further outlined in the City's RFP # 22-42, incorporated by reference herein ("Services"). The City retains the right to make changes to the quantities of service within the general scope of the Agreement at any time by a written order. If the changes add to or deduct from the extent of the services, the compensation shall be adjusted accordingly. All such changes shall be executed under the conditions of the original Agreement.

- B. Quality of Services under this Agreement shall be of the level of quality performed by persons regularly rendering this type of service. Determination of acceptable quality shall be made solely by the Contract Administrator.
- C. Contractor shall perform its Services for the Project in compliance with all statutory, regulatory, and contractual requirements now or hereafter in effect as may be applicable to the rights and obligations set forth in the Agreement. Contractor shall also comply with and be subject to the City's policies applicable to independent contractors.
- D. Contractor may rely upon the accuracy of reports and surveys provided to it by the City (if any) except when defects should have been apparent to a reasonably competent professional or when it has actual notice of any defects in the reports and surveys.

IV. INDEPENDENT CONTRACTOR

The Parties agree that at all times and for all purposes under the terms of this Agreement each Party's relationship to any other Party shall be that of an independent contractor. Each Party will be solely responsible for the acts of its own employees, agents, and servants. No liability, right, or benefit arising out of any employer/employee relationship, either express or implied, shall arise or accrue to any Party as a result of this Agreement.

Contractor does not have any authority to execute any contract or agreement on behalf of the City, and is not granted any authority to assume or create any obligation or liability on the City's behalf, or to bind the City in any way.

V. COMPENSATION OF CONTRACTOR

- A. Contractor shall be paid in the manner set forth in Exhibit B. Payment shall be made monthly, unless another payment term is specified in Exhibit B, following receipt of invoices submitted by Contractor, and approved by the Contract Administrator.
- B. Contractor will be compensated for Services performed in addition to the Services described in Article III, only when the scope of and compensation for those additional Services have received prior written approval of the Contract Administrator.
- C. Contractor shall keep complete records of work performed (e.g., tasks performed, hours allocated, etc.) so that the City may verify invoices submitted by Contractor. Such records shall be made available to the City upon request and submitted in summary form with each invoice.

VI. INSURANCE/INDEMNIFICATION

- A. Contractor shall procure and maintain from the Effective Date or Commencement Date of this Agreement (whichever is earlier) through the conclusion of this Agreement, such insurance policies, including those set forth in Exhibit C, as will protect itself and the City from all claims for bodily injuries, death or property damage that may arise under this Agreement; whether the act(s) or omission(s) giving rise to the claim were made by Contractor, any subcontractor, or anyone employed by them directly or indirectly. Prior to commencement of work under this Agreement, Contractor shall provide to the City documentation satisfactory to the City, through City-approved means (currently myCOI), demonstrating it has obtained the policies and endorsements required by Exhibit C. Contractor shall add registration@mycoitracking.com to its safe sender's list so that it will receive necessary communication from myCOI. When requested, Contractor shall provide the same documentation for its subcontractor(s) (if any).
- B. Any insurance provider of Contractor shall be authorized to do business in the State of Michigan and shall carry and maintain a minimum rating assigned by A.M. Best & Company's Key Rating Guide of "A-" Overall and a minimum Financial Size Category of "V". Insurance policies and certificates issued by non-authorized insurance companies are not acceptable unless approved in writing by the City.
- C. To the fullest extent permitted by law, Contractor shall indemnify, defend, and hold the City, its officers, employees and agents harmless from all suits, claims, judgments and expenses, including attorney's fees, resulting or alleged to result, from any acts or omissions by Contractor or its employees and agents occurring in the performance of or breach in this Agreement, except to the extent that any suit, claim, judgment or expense are finally judicially determined to have resulted from the City's negligence or willful misconduct or its failure to comply with any of its material obligations set forth in this Agreement.

VII. COMPLIANCE REQUIREMENTS

- A. Nondiscrimination. Contractor agrees to comply, and to require its subcontractor(s) to comply, with the nondiscrimination provisions of MCL 37.2209. Contractor further agrees to comply with the provisions of Section 9:158 of Chapter 112 of the Ann Arbor City Code and to assure that applicants are employed and that employees are treated during employment in a manner which provides equal employment opportunity.

- B. Living Wage. If Contractor is a “covered employer” as defined in Chapter 23 of the Ann Arbor City Code, Contractor agrees to comply with the living wage provisions of Chapter 23 of the Ann Arbor City Code. Contractor agrees to pay those employees providing Services to the City under this Agreement a “living wage,” as defined in Section 1:815 of the Ann Arbor City Code, as adjusted in accordance with Section 1:815(3); to post a notice approved by the City of the applicability of Chapter 23 in every location in which regular or contract employees providing services under this Agreement are working; to maintain records of compliance; if requested by the City, to provide documentation to verify compliance; to take no action that would reduce the compensation, wages, fringe benefits, or leave available to any employee or person contracted for employment in order to pay the living wage required by Section 1:815; and otherwise to comply with the requirements of Chapter 23.

VIII. WARRANTIES BY THE CONTRACTOR

- A. The Contractor warrants that the quality of its Services under this Agreement shall conform to the level of quality performed by persons regularly rendering this type of service.
- B. The Contractor warrants that it has all the skills, experience, and professional licenses (if applicable) necessary to perform the Services pursuant to this Agreement.
- C. The Contractor warrants that it has available, or will engage, at its own expense, sufficient trained employees to provide the Services pursuant to this Agreement.
- D. The Contractor warrants that it has no personal or financial interest in the Project other than the fee it is to receive under this Agreement. The Contractor further certifies that it shall not acquire any such interest, direct or indirect, which would conflict in any manner with the performance of the Services it is to provide pursuant to this Agreement. Further Contractor agrees and certifies that it does not and will not employ or engage any person with a personal or financial interest in this Agreement.
- E. The Contractor warrants that it is not, and shall not become overdue or in default to the City for any contract, debt, or any other obligation to the City including real and personal property taxes. Further Contractor agrees that the City shall have the right to set off any such debt against compensation awarded for Services under this Agreement.
- F. The Contractor warrants that its proposal for services was made in good faith, it arrived at the costs of its proposal independently, without consultation, communication or agreement, for the purpose of restricting completion as to any matter relating to such fees with any competitor for these Services; and no attempt has been made or shall be made by the Contractor to induce any other person or firm to submit or not to submit a proposal for the purpose of restricting competition.
- G. The person signing this Agreement on behalf of Contractor represents and

warrants that she/he has express authority to sign this Agreement for Contractor and agrees to hold the City harmless for any costs or consequences of the absence of actual authority to sign.

IX. OBLIGATIONS OF THE CITY

- A. The City agrees to give the Contractor access to the Project area and other City-owned properties as required to perform the necessary Services under this Agreement.
- B. The City shall notify the Contractor of any defects in the Services of which the Contract Administrator has actual notice.

X. ASSIGNMENT

- A. The Contractor shall not subcontract or assign any portion of any right or obligation under this Agreement without prior written consent from the City. Notwithstanding any consent by the City to any assignment, Contractor shall at all times remain bound to all warranties, certifications, indemnifications, promises and performances, however described, as are required of it under the Agreement unless specifically released from the requirement, in writing, by the City.
- B. The Contractor shall retain the right to pledge payment(s) due and payable under this Agreement to third parties.

XI. TERMINATION OF AGREEMENT

- A. If either party is in breach of this Agreement for a period of fifteen (15) days following receipt of notice from the non-breaching party with respect to a breach, the non-breaching party may pursue any remedies available to it against the breaching party under applicable law, including but not limited to, the right to terminate this Agreement without further notice. The waiver of any breach by any party to this Agreement shall not waive any subsequent breach by any party.
- B. The City may terminate this Agreement, on at least thirty (30) days advance notice, for any reason, including convenience, without incurring any penalty, expense or liability to Contractor, except the obligation to pay for Services actually performed under the Agreement before the termination date.
- C. Contractor acknowledges that, if this Agreement extends for several fiscal years, continuation of this Agreement is subject to appropriation of funds for this Project. If funds to enable the City to effect continued payment under this Agreement are not appropriated or otherwise made available, the City shall have the right to terminate this Agreement without penalty at the end of the last period for which funds have been appropriated or otherwise made available by giving written notice of termination to Contractor. The Contract Administrator shall give Contractor written notice of such non-appropriation within thirty (30) days after it receives notice of such non-appropriation.

- D. The provisions of Articles VI and VIII shall survive the expiration or earlier termination of this Agreement for any reason. The expiration or termination of this Agreement, for any reason, shall not release either party from any obligation or liability to the other party, including any payment obligation that has already accrued and Contractor's obligation to deliver all Deliverables due as of the date of termination of the Agreement.

XII. REMEDIES

- A. This Agreement does not, and is not intended to, impair, divest, delegate or contravene any constitutional, statutory and/or other legal right, privilege, power, obligation, duty or immunity of the Parties.
- B. All rights and remedies provided in this Agreement are cumulative and not exclusive, and the exercise by either party of any right or remedy does not preclude the exercise of any other rights or remedies that may now or subsequently be available at law, in equity, by statute, in any agreement between the parties or otherwise.
- C. Absent a written waiver, no act, failure, or delay by a Party to pursue or enforce any rights or remedies under this Agreement shall constitute a waiver of those rights with regard to any existing or subsequent breach of this Agreement. No waiver of any term, condition, or provision of this Agreement, whether by conduct or otherwise, in one or more instances, shall be deemed or construed as a continuing waiver of any term, condition, or provision of this Agreement. No waiver by either Party shall subsequently affect its right to require strict performance of this Agreement.

XIII. NOTICE

All notices and submissions required under this Agreement shall be delivered to the respective party in the manner described herein to the address stated below or such other address as either party may designate by prior written notice to the other. Notices given under this Agreement shall be in writing and shall be personally delivered, sent by next day express delivery service, certified mail, or first class U.S. mail postage prepaid, and addressed to the person listed below. Notice will be deemed given on the date when one of the following first occur: (1) the date of actual receipt; (2) the next business day when notice is sent next day express delivery service or personal delivery; or (3) three days after mailing first class or certified U.S. mail.

If Notice is sent to the CONTRACTOR, it shall be addressed and sent to:

Turnkey Network Solutions
7020 Southbelt Drive SE
Caledonia, MI 49316

If Notice is sent to the CITY, it shall be addressed and sent to:

City of Ann Arbor
Attention: Tom Shewchuk
301 E. Huron St.
Ann Arbor, Michigan 48104

With a copy to: The City of Ann Arbor
ATTN: Office of the City Attorney
301 East Huron Street, 3rd Floor
Ann Arbor, Michigan 48104

XIV. CHOICE OF LAW AND FORUM

This Agreement will be governed and controlled in all respects by the laws of the State of Michigan, including interpretation, enforceability, validity and construction, excepting the principles of conflicts of law. The parties submit to the jurisdiction and venue of the Circuit Court for Washtenaw County, State of Michigan, or, if original jurisdiction can be established, the United States District Court for the Eastern District of Michigan, Southern Division, with respect to any action arising, directly or indirectly, out of this Agreement or the performance or breach of this Agreement. The parties stipulate that the venues referenced in this Agreement are convenient and waive any claim of non-convenience.

XV. OWNERSHIP OF DOCUMENTS

Upon completion or termination of this Agreement, all documents (i.e., Deliverables) prepared by or obtained by the Contractor as provided under the terms of this Agreement shall be delivered to and become the property of the City. Original basic survey notes, sketches, charts, drawings, partially completed drawings, computations, quantities and other data shall remain in the possession of the Contractor as instruments of service unless specifically incorporated in a deliverable, but shall be made available, upon request, to the City without restriction or limitation on their use. The City acknowledges that the documents are prepared only for the Project. Prior to completion of the contracted Services the City shall have a recognized proprietary interest in the work product of the Contractor.

XVI. CONFLICTS OF INTEREST OR REPRESENTATION

Contractor certifies it has no financial interest in the Services to be provided under this Agreement other than the compensation specified herein. Contractor further certifies that it presently has no personal or financial interest, and shall not acquire any such interest, direct or indirect, which would conflict in any manner with its performance of the Services under this Agreement.

Contractor agrees to advise the City if Contractor has been or is retained to handle any matter in which its representation is adverse to the City. The City's prospective consent to the Contractor's representation of a client in matters adverse to the City, as identified above, will not apply in any instance where, as the result of Contractor's representation, the Contractor has obtained sensitive, proprietary or otherwise confidential information of a non-public nature that, if known to another client of the Contractor, could be used in any such other matter by the other client to the

material disadvantage of the City. Each matter will be reviewed on a case by case basis.

XVII. SEVERABILITY OF PROVISIONS

Whenever possible, each provision of this Agreement will be interpreted in a manner as to be effective and valid under applicable law. However, if any provision of this Agreement or the application of any provision to any party or circumstance will be prohibited by or invalid under applicable law, that provision will be ineffective to the extent of the prohibition or invalidity without invalidating the remainder of the provisions of this Agreement or the application of the provision to other parties and circumstances.

XVIII. EXTENT OF AGREEMENT

This Agreement, together Exhibits A, B, and C, constitutes the entire understanding between the City and the Contractor with respect to the subject matter of the Agreement and it supersedes, unless otherwise incorporated by reference herein, all prior representations, negotiations, agreements or understandings whether written or oral. Neither party has relied on any prior representations, of any kind or nature, in entering into this Agreement. No terms or conditions of either party's invoice, purchase order or other administrative document shall modify the terms and conditions of this Agreement, regardless of the other party's failure to object to such form. This Agreement shall be binding on and shall inure to the benefit of the parties to this Agreement and their permitted successors and permitted assigns and nothing in this Agreement, express or implied, is intended to or shall confer on any other person or entity any legal or equitable right, benefit, or remedy of any nature whatsoever under or by reason of this Agreement. This Agreement may only be altered, amended or modified by written amendment signed by the Contractor and the City. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall be deemed to be one and the same agreement.

XIX. ELECTRONIC TRANSACTION

The parties agree that signatures on this Agreement may be delivered electronically in lieu of an original signature and agree to treat electronic signatures as original signatures that bind them to this Agreement. This Agreement may be executed and delivered by facsimile and upon such delivery, the facsimile signature will be deemed to have the same effect as if the original signature had been delivered to the other party.

XX. EFFECTIVE DATE

This Agreement will become effective when all parties have signed it. The Effective Date of this Agreement will be the date this Agreement is signed by the last party to sign it.

[REMAINDER OF PAGE LEFT BLANK; SIGNATURE PAGE FOLLOWS]

FOR TURNKEY SOLUTIONS

By _____

Name: _____

Title: _____

Date: _____

FOR THE CITY OF ANN ARBOR

By _____

Christopher Taylor, Mayor

By _____

Jacqueline Beaudry, City Clerk

This ____ day of _____, 20____

Approved as to substance

By _____

Milton Dohoney Jr., City Administrator

Approved as to form and content

Atleen Kaur, City Attorney

EXHIBIT A SCOPE OF SERVICES AND DETAILED SPECIFICATIONS

1. Background

The City has built multiple fiber optics networks and will continue to expand in the future. As a result, the City is in need of on-demand routine maintenance, testing, troubleshooting, remediation, and emergency restoration to limit network down time and maximize network availability for the City and its customers. Emergency restoration response times need to be within four (4) hours of the City contacting a contractor and repairs within twelve (12) hours or less. Following is a description of the existing and future fiber networks that require on-demand maintenance under this Agreement, collectively referred to herein as “the Network”:

- **A2 I-NET Fiber Network** - A 144 fiber strand 35-mile backbone that traverses around the east and west side of the City with a bi-sector connecting the City’s 2 data centers. There are approximately 10 miles of lateral connections consisting of a 48-strand fiber count cable. The backbone is approximately 40% aerial and 60% underground. The lateral connections are a combination of aerial and underground.
- **Technology Park Network** - The City is currently constructing a 9-mile underground fiber/conduit network in the City of Ann Arbor Downtown Development Authority (DDA) District. Initially it will consist of 432 fiber strands capable of expanding to 3,456 strands. The entire fiber/conduit network is 100% underground.
- **Ann Arbor/Ypsilanti Broadband Network** - In 2023, the City will be constructing approximately 20 miles of underground fiber from the City of Ann Arbor to the City of Ypsilanti. It will have an initial capacity of 432 fiber strands capable of expanding to 1,728 strands. It is anticipated the fiber/conduit backbone will be 100% underground.
- **Traffic Control Network** – The City traffic control system is connected via a fiber network throughout the City. It is a combination of underground and aerial fiber.

The City has over 40 locations throughout the City connected to the City’s fiber as well as external customers that utilize dark fiber.

2. Requirements

Contractor shall provide all of the following services to the City upon request:

1. Required services include all aspects of maintaining both aerial and underground fiber networks. This list is not exhaustive and Contractor will be required to provide additional, unlisted services upon reasonable request:
 - a. Routine Maintenance.
 - b. Emergency Restoration.
 - c. Tree Trimming of Aerial fiber segments on a Three-Year Cycle (~ 22 miles).
 - d. Permitting, Testing, and Verification per industry standards.
 - e. As-Built Drawings of all Adds, Moves and Changes to the Network,

- including new splices.
 - f. Fiber splicing.
 - g. Splice enclosure installation.
 - h. Hand-hole repair and replacement.
 - i. Testing.
 - j. Troubleshooting.
 - k. Problem resolution.
2. All work performed by the Contractor shall be in accordance with the City's specifications and all applicable standards included but not limited to the following:
 - a. ANSI, ATIS, ASTM, BOCA, BICSI, EIA, IEEE, MI-OSHA, NEMA NESC, NFPA, OSHA, TIA, UL, and any other applicable industry standard(s).
 - b. The City's specifications found at:
<http://www.a2gov.org/departments/engineering/Pages/Engineering-and-Contractor-Resources.aspx>
 - c. All work performed must adhere to the Fiber Optic Design and Construction Detailed Specifications outlined in Section 3 below, unless otherwise approved by the City.
 3. When any maintenance and repair is completed, Contractor shall perform continuity testing of optical fibers using OTDR. Test results cannot exceed 0.25 dB loss per kilometer.
 4. Any maintenance and repair changes must be pre-approved by the City before commencing with said change. Redline edit drawings in AutoCAD format will be required for documenting any approved changes.
 5. Contractor is responsible for all jobsite cleanup and the removal of all spent fiber reels and other materials used during maintenance and repair (as needed).
 6. Contractor warrants that all materials furnished shall be new, and free from defects.
 7. Contractor warrants that all materials and workmanship used in this installation are as herein specified and shall provide all material and labor required to make good any defects due to faulty materials or workmanship which become apparent within a one-year period from completion of any work performed pursuant to this Agreement.
 8. The equipment and materials manufacturers are expected to recognize that they are responsible for the failure of their products to perform in accordance with data furnished by them or their authorized representatives, as well as misrepresentations of such data.
 - a. When products have been installed in accordance with the manufacturer's published or written instructions and recommendations, and such products fail, Contractor is responsible for working with the manufacturer to replace those products. All associated work and materials for such replacement shall be performed without additional cost to the City.

- b. Contractor shall obtain and assign to the City warranties and deliver to the City all warranty information for materials used in performing work under this Agreement.

3. Fiber Optic Design and Construction Detailed Specifications

a. General Requirements

- i. All requirements outlined herein shall apply equally to Contractor and all of Contractor's sub-contractors. All references to Contractor shall refer equally to all of sub-contractors.
- ii. All work performed by Contractor shall be in accordance with the City's specifications and all applicable standards including but not limited to: ANSI, ATIS, ASTM, BOCA, BICSI, EIA, IEEE, MI-OSHA, NEMA NESC, NFPA, OSHA, TIA, UL, and any other applicable industry standards.
- iii. All Traffic Control needed to perform any and all portions of the work is the responsibility of Contractor and shall be included in the cost, regardless of the number of traffic control mobilizations and setups required.
- iv. Any damage to and not limited to: landscaping, private property, University of Michigan property, roads, curb and gutter, sidewalk, or existing utilities shall be repaired by Contractor and/or any their sub-contractor(s) immediately at no cost to the project.
- v. Contractor shall always confine work to ROW property. At no time, shall Contractor enter private property, University of Michigan property, or perform any work not authorized by the City.
- vi. Contractor is responsible for locating all existing underground services including but not limited to: Electric, gas, telephone, data, water, and sewer prior to beginning any underground work. Coordination and compliance with Miss Dig are required.
- vii. Contractor will provide experienced installers who are licensed or certified to install Corning fiber manufactured material.
- viii. Contractor is required to facilitate inspections of work with the City's designated representative (design, engineering services contractor) that is providing construction oversight under a separate contract. Any deficiencies revealed during inspections by the City and/or designated representatives of the City, are the sole responsibility of Contractor to resolve.
- ix. When work is completed, Contractor shall perform continuity testing of optical fibers using OTDR and industry standards for testing. Refer to Section "Acceptance and Testing" for requirements.
- x. Contractor shall install necessary lighting protection in accordance with industry standards.
- xi. Bonding on aerial Network segments is required per AT&T and DTE pole attachment agreements. Contractor must be familiar with AT&T and DTE pole attachment requirements and comply with all such requirements. Copies of the City's pole attachment agreements with AT&T and with DTE will be provided to Contractor upon award of the contract.
- xii. Grounding for underground Network segments is required at every splice enclosure with a minimum of 8 (eight) feet of grounding rod. Grounding rods must meet applicable industry standard specifications.

- xiii. Contractor must ensure adequate clearance exists between proposed fiber build and other utilities, ground, rail, roads, and water. At a minimum Contractor is required to build conforming to NESC codes.
- xiv. Contractor is also responsible to verify local utilities do not have more stringent clearance codes.
- xv. Contractor is responsible for adhering to all right-of-way and utility permitting terms and conditions as set forth in each right-of-way permit.
- xvi. Any construction changes must be pre-approved by the City and the City's design and planning contractor before commencing with said change. Redline edited drawings in AutoCAD format will be required to document any approved changes.
- xvii. If deficiencies and/or non-compliance issues are discovered by the City, Contractor is responsible for their correction.
- xviii. Contractor is responsible for all jobsite cleanup and for removal of all spent fiber reels and other materials used during construction.
- xix. Any modifications, repairs or modifications involving Corning products must adhere to Corning warranty standards.

b. Construction Restoration

Contractor is responsible for the restoration of the work area, including landscaping, to its original condition after work is complete. Surrounding area must be filled, leveled, and compacted. If grass restoration is required, Contractor must apply seed or hydro seed. If work cannot be completed due to unseasonal conditions, the work will be completed when feasible.

c. Utility Engineering Fees and Permits

City Right-Of-Way utility fees will be paid directly by the City. Contractors are responsible to coordinate efforts with the utilities involved.

d. Make Ready Fees

Make ready fees will be paid directly by the City. Contractors are responsible to coordinate efforts with utilities involved.

e. Cable Pulling

- i. Lateral connections will be spliced into the main fiber ring and will be terminated at a fiber distribution unit located at each location or predetermined termination point.
- ii. Contract shall install the cable such that the optical and mechanical characteristics of the fiber are not degraded.
- iii. Contractor must comply with the manufacturer's recommended installation temperature, pulling tension and bend radius.
- iv. Cables must not violate the minimum bend radius or the maximum tension, both during and after installation. Corner rollers (wheels), if used, must not have radii less than the minimum installation bending radius of the cable. A series array of smaller wheels can be used for accomplishing the bend if the cable manufacturer specifically approves the array.

- v. Contractor shall use a clutch device to ensure the allowable pulling tension is not exceeded if the cable is pulled by mechanical means. Also, Contractor shall attach a strain gauge to the pulling line at the cable exit location, and at a sufficient distance from the take-up device, such that the strain gauge can be read throughout the entire cable pulling operation.
- vi. Cables shall be fed directly in by hand or over large diameter bends to prevent kinks, small bends, sharp edges, and crossovers. Cable shall also be fed out of each pull box in a fashion that minimizes bends. Sufficient slack shall be left so that each cable may be trained to its final location free of stress and completely clear of hand-hole openings.
- vii. The pulling tension shall be continuously monitored to assure that the maximum recommended load is not exceeded. If the expected loads are close to maximum, additional pull boxes should be considered and/or the use of lubricants compatible with the outer jacket material of the cable.
- viii. Use entry guide chutes to guide the cable into the pull-box conduit ports.
- ix. Only lubricants approved by the cable manufacturer are permitted. Wipe the exposed cable in a pull box, junction box, or cabinet clean of cable lubricant with a cloth, after the cable has been installed.
- x. Fiber optic cable ends must be sealed to prevent the entry of water.

f. Cable Lubricant

For new conduit, lubrication of the conduit before pulling is required—particularly if there are several bends.

g. Cable Splicing

- i. All splices must be fusions splices. Splices shall conform to ANSI/TIA/EIA standards.
- ii. All fusion splices will have with a maximum loss of < 0.05 dB unidirectional loss using 1550 nm optical source, a maximum bi-directional average loss of <0.15 dB using 1550 nm optical source.
- iii. Similarly, a maximum loss of < 0.3 dB unidirectional loss using 1310 nm optical source, and a maximum bi-directional average loss of <0.20 dB loss using a 1310 nm optical source, shall be achieved. Testing must use industry standard TIA-472D000-B and Measurement Method FOTP78. Refer to section “Acceptance and Testing” for specific requirements on testing.
- iv. Each spliced fiber must be packaged in a heat shrinkable splice protection sleeve with strength member. The protection sleeve must cover the splice any bare fiber stripped of its coating. The use of RTV or silicone is strictly prohibited.

h. Labeling and Identification

Identification labels must be supplied by Contractor and installed by Contractor on the fiber in each hand-hole and at every point of attachment on utility poles per specifications from the pole owner, per the utility pole attachment agreements, and the City requirements listed below.

- i. Aerial Cables – Contractor is responsible for supplying and installing aerial cable markers per utility company specifications and/or pole attachment agreements.
- ii. Underground Cables and Splice Cables – Contractor is responsible for supplying and installing underground cable markers identical to the City’s original fiber network construction to identify cable ID or Code, cable type, strand count and distance in feet.

i. Aerial Construction Requirements

- i. Grounding – Contractor is responsible to ensure proper grounding, bonding, and that lightning protection is installed according to industry standards.
- ii. Aerial Cable - All cable must be supported by support a strand (i.e., messenger cable) per industry standards.
- iii. Aerial Cable Slack Requirements -150-foot maintenance loops are required every 1,500 feet, as specified in engineering drawings. Maintenance loops must be dressed and stored properly. All slack shall be physically protected.
- iv. Provide aerial service loops with snowshoes in various locations (as specified on engineering drawings) to provide sufficient slack in the event that a repair becomes necessary.
- v. Aerial Cable Lashing - All cable lashing will be double-lashed with 0.038 inches, Type 302 austenitic, non-magnetic and thermally non-hardening stainless steel with a break strength of at least 115 pounds or 0.045 inch, Type 430 Magnetic, thermally non-hardening ferritic stainless steel with a break strength of at least 125 pounds.

j. Underground Construction Requirements

- i. All fiber buried with directional boring must be a minimum of 4 (four) feet below grade.
- ii. Newly installed conduits will be clear of all dirt, foreign matter, water, and debris before cable is installed.
- iii. Conduit - For FON segments requiring new conduit installation that conduit must be 3 (three) inch diameter Dura-Line Smooth-wall HDPE Conduit or an equivalent. Provide as an option, conduit with Silicore-TM permanently lubricated lining so greater pulling and jetting distances can be achieved where necessary.
- iv. Cables that are run through existing conduit cannot go through the center of an existing slack loop of cable (fiber/electric/etc.) so as to render the existing slack loop useless, or so that it could not be taken out of the handhole and uncoiled.
- v. Conduits added to existing handholes, or new handholes, that enter through the side wall need to be concrete sealed so that mud/dirt does not fill the handholes over time. This includes locations where handholes are upgraded with existing infrastructure in place. All conduit entries and handhole cuts need to be sealed up.
- vi. Upward angled conduits in handholes need to be at least 8 (eight) inches from the bottom of the lid – or some value similar to that to allow bend radius of cables.

- k. When conduits enter the handhole lower than the bottom lip, they must have elbows, or sweeps, that get them above the bottom lip. This prevents dirt from getting in and plugging the conduit.
- l. Above Ground Markers - Above ground markers must be installed ~500 feet or a lesser line-of-site along burial path, depending on Network segment geography.
- m. Cable Slack Requirements - Throughout the underground cable plant, pull and store excess cable slack at designated intervals per the engineering drawings.
- n. Contractor must provide adequate drainage for handholes using a stone-based material.
- o. All underground work needs to be inspected by the City before acceptance. Contractor is responsible for correcting all deficiencies in their work.
- p. Above-Ground Cabinet Construction

Install Corning Cross-Connect Cabinets according to manufacturer's specifications and the City's specifications.

q. Materials Specifications

ALL materials required will be supplied and installed by Contractor, including the following materials, unless otherwise authorized by the City:

i. Fiber Optic Cable

All fiber optic cables must be indoor/outdoor, plenum-rated cables for inter-building and intra-building backbones in aerial, duct, and riser applications. Deliver the cable on reels without splices. Ensure both ends of the cable are sealed to prevent moisture ingress.

ii. 144F Single Mode Fiber Cable

Provide CommScope® Outside Plant Single Jacket/Single Armor, Gel-Free, Dry-Lock, Outdoor Stranded Loose Tube Cable (Part # D- 144-LA-8W-F12NS), or an approved equivalent.

iii. 48F Single Mode Fiber Cable

Provide CommScope® Outside Plant Single Jacket/Single Armor, Gel-Free, Dry-Lock, Outdoor Stranded Loose Tube Cable (Part # D- 048-LA-8W-F12NS), or an approved equivalent.

iv. Communications Tracer wire

Encore Wire Corporation Tracer Wire HMWPE 45 MIL 600 Volt (UL) DIR – 14AWG

v. Cable Connectors

LC connectors are required, providing a small form ceramic ferrule with 1.25 mm ferrule that are easily terminated with any adhesive.

vi. Cable Risers

i. FREEDOM tight-buffered cable, risers, 48F and 144F, single-mode (OS2), by Corning Optical Communications, or an approved equal.

ii. Risers need to be galvanized rigid conduit for the first 10' from grade going up. Then, Schedule 80 PVC is acceptable from that point going up the pole to the aerial attachment location.

vii. Splice Closures

Corning Optics Splice Closure Fiber (SCF) or equivalent, preloaded splice trays that are aerial and underground rated allowing up to 288 single fiber splices. The closure must provide ports for uncut feeder cables and ports for drop cables. The closure, in canister configuration, with a quick-seal mechanical seal port, must allow for rapid and easy addition of cables after initial installation is complete.

viii. Conduit

Three-inch Dura-Line Smoothwall HDPE Conduit or an equivalent is required for each Network segment needing newly installed underground conduit. Dura-Line is made to Industry standards for power and communications applications. It can be installed using open trench methods, HDD (Horizontal Directional Drilled) plowed, or pulled into conduit. Price Smoothwall HDPE conduit with optional Silicore™ permanently lubricated lining, Smoothwall, so ducts can be maximized for greater pulling and jetting distances, reducing the coefficient of friction over standard HDPE conduit.

ix. Handholes

Quazite Handholes. All Handholes at splice locations and underground slack loop locations are 30"x48" double deep, cover test load ratings of 15,000/22,500, box test load rating of 22,500/33,750, minimum.

x. Closet Connector Housing (CCH) and Patch Panels

Several locations will require CCHs and patch panels. CCHs provide interconnect or cross-connect capabilities between outside plant, riser or distribution cables and opto-electronics. See below for CCH specifications:

Closet Connector Housing (CCH) and Patch Panels Specifications		
Item	Supplier	Description
CCH-04U	Corning Optical	CLOSET CONN HSG 4U F/12 PNLs
WCH-02P	Corning Optical	Wall-MNTD CLST HOUS/2CCH PNL
CCH-01U	Corning Optical	CLOSET CONN HSG 1U F/2 PNLs
CCH-CP24-A9	Corning Optical	CCH PNL W/12 LC DUPLEX SM
CCH-CP12-A9	Corning Optical	CCH PNL W/6 LC DUPLEX SM

r. Acceptance and Testing

- i. Contractor is required to construct per detailed engineering drawings that will be provided by the City after the Design and Planning is completed.
- ii. Any deviation from the original design must be requested by Contractor and approved by the City before the work is done.
- iii. Deviations to splicing and/or site location terminations must be pre-approved by the City and then appropriately documented with red-line drawings and supporting documentation.
- iv. All testing results are to be provided and accepted by Corning in order for the City to maintain its Corning warranty.
- v. Contractor is required to test the fiber after installation, including all splicing and termination, after completion. Test the fiber from end to end through any interconnections to ensure that the path is properly installed, and that polarization and routing are correct and documented. Out of specification deficiencies identified must be properly corrected per industry standards.
- vi. For each network segment or fiber optic link, including spare fibers, determine whether the optical loss is within the limits permissible under applicable testing industry standards below.
- vii. A link is defined as a continuous segment of fiber between one connector and another connector.
- viii. When testing links that do not have connectors on both ends, Contractor shall use a mechanical splice to attach a pigtail to the unterminated fiber for the duration of the test.
- ix. The following industry testing standards shall be used to verify proper construction and installation:
 - i. Testing industry standard FOTP-78 (Fiber Optic Test Procedure) will be applied to all fiber splicing and unused fibers within the following parameters using the bidirectional method established by FOTP-78, as follows:
 - a. All fusion splices will have less than 0.05 dB loss using 1550 nm optical source. The test will be bi-directional with no

splice loss being greater than 0.05 dB. Since the test is bi-directional, the splice loss refers to the final loss value obtained once the test results are averaged at each splice; none being greater than 0.05 dB.

- b. Terminations will have loss less than 0.4 dB using 1550 nm and 1310 nm optical source. Testing methods will apply industry standard TIA-472D000-B Section 8.2.1 (Telecommunications Industry Association) using Optical Time Domain Reflectometer (OTDR) as the measurement device.
 - c. No manual calculations of bi-directional averages are allowed.
 - d. Record and document all splice losses and termination losses and submit to the City for approval.
- ii. Perform OTDR testing which captures optical attenuation on all fibers after post installation. Optical attenuation performance shall meet or exceed standard TIA472D000-B Section 8.1 for single- mode fiber. The maximum optical attenuation loss cannot exceed 0.25 dB/km at 1550 and 0.35 dB/km 1310 nm testing.

s. Splice Testing Documentation

Documentation of the fiber optic cable plant (test results) should follow ANSI/TIA/EIA-606 Administrative Standard for Telecommunications infrastructure of commercial Buildings. This documentation shall include the insertion loss data.

t. Documentation

- i. Prepare diagrams showing all the links tested in this project. On each line representing a link, show the maximum allowable loss and the actual loss. Ensure the actual loss is the one measured after all corrective actions have been taken.
- ii. Provide an OTDR trace for all fibers to document the location of the sources of optical loss in the cable (refer Acceptance and Testing).
- iii. All Red-line drawings, field notes, documentation, submitted to City of Ann Arbor in a format acceptable to the City (e.g., Spatially- referenced AutoCad files, GIS shapefile, etc.).
- iv. Schematics and detailed circuit diagrams of all splice locations shall be provided in an acceptable format to the City.
- v. All fiber testing documentation must be provided to the City and Corning.

u. Warranty and Workmanship

- i. Contractor warrants that all materials furnished shall be new, and free from defects.
- ii. Contractor warrants that the materials and workmanship used in the construction are as herein specified and shall provide all material and labor required to make good any defects due to faulty materials or workmanship which become apparent within a one-year period from the completion of any task performed pursuant to this Agreement.

**EXHIBIT B
COMPENSATION**

General

Contractor shall be paid for those Services performed pursuant to this Agreement inclusive of all reimbursable expenses (if applicable), in accordance with the terms and conditions herein. The Compensation Schedule below states the nature and amount of compensation Contractor may charge the City:

Item Number	Item Category	Item Description	Comments	Cost	Unit
1	Routine Maintenance: Non-emergency	Aerial or underground maintenance. Normal business hours		\$120.00/Hr	Hourly rate per person
2	Emergency Restoration	Aerial or underground on-demand maintenance 24x7x365.		\$200.00/Hr	Hourly rate per person
3	Routine Maintenance: Non-emergency	Fiber Splicing. Normal business hours.		\$128.00/Hr	Hourly rate per person
4	Emergency Restoration	Fiber Splicing 24x7x365.		\$200.00/Hr	Hourly rate per person
5	Emergency Restoration	Network locating services 24x7x365. **The city will perform locating services for routine maintenance.	TKNS has provided an Hourly Rate	\$115.00/Hr	Per Incident
6	Proactive annual ride out inspection	Annual Inspection	Per Inspection	\$2500.00	Cost per inspection
7	Routine Maintenance	Tree trimming of aerial sections		NO BID	Cost per "x" years
8	Routine Maintenance	Right-of-way permitting		\$85.00/Hr	Hourly Rate
9	Routine Maintenance	Underground Boring	Hourly Rate	\$120.00/Hr	Per Foot

10	Emergency Restoration	Underground Boring	Hourly Rate	\$200.00/Hr	Per Foot
11	Routine Maintenance	Aerial Construction	Hourly Rate	\$120.00/Hr	Per Foot
12	Emergency Restoration	Aerial Construction	Hourly Rate	\$200.00/Hr	Per Foot
13	Routine Maintenance	Handhole replacement		\$2300.00/unit	Per Unit
14	Emergency Restoration	Handhole replacement		\$2800.00/unit	Per Unit
15	Emergency Restoration	4-hour response, 8-hour repair of a 48-count SMF fiber cable	Assumes splicing only for 48ct with a \$700 allowance for materials	\$5980.00	Per Incident
16	Emergency Restoration	4-hour response, 8-hour repair of a 144-count SMF fiber cable	Assumes splicing only for 144ct with a \$1000 allowance for materials	\$6280.00	Per Incident
17	Emergency Restoration	4-hour response, 8-hour repair of a 432-count SMF fiber cable	Assumes splicing only for 432ct with a \$1600 allowance for materials	\$12,160.00	Per Incident
18	Emergency Restoration	4-hour response, 12-hour repair of a 48-count SMF fiber cable	Assumes splicing only for 48ct with a \$700 allowance for materials	\$7100.00	Per Incident
19	Emergency Restoration	4-hour response, 12-hour repair of a 144-count SMF fiber cable	Assumes splicing only for 144ct with a \$1000 allowance for materials	\$7400.00	Per Incident
20	Emergency Restoration	4-hour response, 12-hour repair of a 432-count SMF fiber cable	Assumes splicing only for 432ct with a \$1600 allowance for materials	\$14,400.00	Per Incident

**EXHIBIT C
INSURANCE REQUIREMENTS**

From the earlier of the Effective Date or the Commencement Date of this Agreement, and continuing without interruption during the term of this Agreement, Contractor shall have, at a minimum, the following insurance, including all endorsements necessary for Contractor to have or provide the required coverage.

- A. Contractor shall have insurance that meets the following minimum requirements:
1. Professional Liability Insurance or Errors and Omissions Insurance protecting Contractor and its employees in an amount not less than \$1,000,000.
 2. Worker's Compensation Insurance in accordance with all applicable state and federal statutes. Further, Employers Liability Coverage shall be obtained in the following minimum amounts:

Bodily Injury by Accident - \$500,000 each accident
Bodily Injury by Disease - \$500,000 each employee
Bodily Injury by Disease - \$500,000 each policy limit
 3. Commercial General Liability Insurance equivalent to, as a minimum, Insurance Services Office form CG 00 01 04 13 or current equivalent. The City shall be an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. Further, the following minimum limits of liability are required:

\$1,000,000 Each occurrence as respect Bodily Injury Liability or Property Damage Liability, or both combined
\$2,000,000 Per Project General Aggregate
\$1,000,000 Personal and Advertising Injury
 4. Motor Vehicle Liability Insurance equivalent to, as a minimum, Insurance Services Office form CA 00 01 10 13 or current equivalent. Coverage shall include all owned vehicles, all non-owned vehicles and all hired vehicles. The City shall be an additional insured. There shall be no added exclusions or limiting endorsements that diminish the City's protections as an additional insured under the policy. Further, the limits of liability shall be \$1,000,000 for each occurrence as respects Bodily Injury Liability or Property Damage Liability, or both combined.
 5. Umbrella/Excess Liability Insurance shall be provided to apply in excess of the Commercial General Liability, Employers Liability and the Motor Vehicle coverage enumerated above, for each occurrence and for aggregate in the amount of \$1,000,000.

- B. Insurance required under A.3 and A.4 above shall be considered primary as respects any other valid or collectible insurance that the City may possess, including any self-insured retentions the City may have; and any other insurance the City does possess shall be considered excess insurance only and shall not be required to contribute with this insurance. Further, Contractor agrees to waive any right of recovery by its insurer against the City for any insurance listed herein.
- C. Insurance companies and policy forms are subject to approval of the City Attorney, which approval shall not be unreasonably withheld. Documentation must provide and demonstrate an unconditional and unqualified 30-day written notice of cancellation in favor of the City. Further, the documentation must explicitly state the following: (a) the policy number(s); name of insurance company; name(s), email address(es), and address(es) of the agent or authorized representative; name and address of insured; project name; policy expiration date; and specific coverage amounts; (b) any deductibles or self-insured retentions, which may be approved by the City in its sole discretion; (c) that the policy conforms to the requirements specified. Contractor shall furnish the City with satisfactory certificates of insurance and endorsements prior to commencement of any work. If any of the above coverages expire by their terms during the term of this Agreement, Contractor shall deliver proof of renewal and/or new policies and endorsements to the Administering Service Area/Unit at least ten days prior to the expiration date.