GG
10/30/14
Item No. 24

AN ORDINANCE 2014-10-30-0834

APPROVING AN AGREEMENT WITH CPS ENERGY FOR PERMANENT ACCESS TO HIGH-SPEED COMMUNICATIONS BROADBAND LINES.

* * * * *

WHEREAS, in 2007, the City Council passed Ordinance No. 2007-06-21-0714 approving a Memorandum of Understanding ("MOU") under which the City and CPS Energy agreed to cooperate in the development of a joint high-speed communications wide area network using excess high-speed communications broadband lines (also referred to as "dark fiber") throughout the electric distribution system; and

WHEREAS, access to these broadband lines gave the City for the first time the ability to develop a citywide broadband network (hereinafter referred to as "COSANet") by connecting City facilities and communications equipment to CPS Energy broadband lines at substations; and

WHEREAS, the MOU established a governance structure for planning the connection of City facilities to the CPS Energy broadband lines (hereinafter referred to as the "Network Operations Committee"); and

WHEREAS, in 2012 City officials called for expanding the benefits of COSANet to other governmental and educational institutions in the community, but there was an impediment to achieving this goal given that under the MOU CPS Energy reserved the right to rescind access to the broadband lines if they were needed for utility operations; and

WHEREAS, the City and CPS Energy have reached agreement on that addresses this impediment by granting the City permanent and irrevocable use of excess CPS Energy broadband lines in exchange for access to City-owned towers for the installation of antenna equipment and access to share City-owned broadband lines where they exist; **NOW THEREFORE:**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SAN ANTONIO:

SECTION 1. The terms and conditions of the Infeasible Right of Use Agreement between the City of San Antonio and CPS Energy (the "IRU Agreement") are hereby approved. A copy of the IRU Agreement in its final form and executed by CPS Energy is attached hereto and made a part of this Ordinance as **Exhibit "A."**

SECTION 2. Except as superseded by the IRU Agreement, the provisions of the MOU as approved by Ordinance No. 2007-06-21-0714 remain in effect. The City Council finds that the terms and conditions of the IRU Agreement will enable City staff to engage in meaningful discussions with other governmental entities in the community interested in connecting and financially contributing to being a part of COSANet.

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SECTION 3. The City Manager or her designee is hereby authorized to execute the IRU Agreement and any and all other documents necessary to fulfill the purpose and intent of this Ordinance.

SECTION 4. This Ordinance shall become effective immediately upon the passage by eight (8) affirmative votes of the City Council, otherwise will become effective following the tenth (10th) day after passage thereof.

PASSED AND APPROVED, this 30th day of October 2014.

M A Y O R
Ivy R. Taylor

ATTEST:

Leticia M. Vacek
City Clerk

APPROVED AS TO FORM:

Robert F. Greenblum
City Attorney

Agenda Item:	**24**
Date:	10/30/2014
Time:	03:00:05 PM
Vote Type:	Motion to Approve
Description:	An Ordinance approving an agreement with CPS Energy for permanent access to high-speed communications broadband lines. [Ben Gorzell, Chief Financial Officer; Hugh Miller, Director, Information Technology Services]
Result:	Passed

Voter	Group	Not Present	Yea	Nay	Abstain	Motion	Second
Ivy R. Taylor	Mayor		x				
Diego Bernal	District 1		x				x
Keith Toney	District 2		x				
Rebecca Viagran	District 3		x				
Rey Saldaña	District 4		x				
Shirley Gonzales	District 5		x				
Ray Lopez	District 6		x				
Cris Medina	District 7		x				
Ron Nirenberg	District 8		x			x	
Joe Krier	District 9		x				
Michael Gallagher	District 10		x				

Exhibit “A”

DARK FIBER INDEFEASIBLE RIGHT OF USE AGREEMENT BETWEEN CPS ENERGY AND CITY OF SAN ANTONIO

THIS DARK FIBER INDEFEASIBLE RIGHT OF USE AGREEMENT (Agreement) is made on the _____ day of _____, 2014 (the Effective Date), by and between the City of San Antonio, Texas, a Texas home-rule municipal corporation (City) and the City Public Service Board of San Antonio, Texas (CPS Energy), the municipally owned electric and gas utility owned by City. Each may be referred to as "Party" or may be referred to jointly as the "Parties."

RECITALS

WHEREAS, on July 1, 2007, the City and CPS Energy executed and entered into the operations required by the "Amended Memorandum Of Understanding Between The City Of San Antonio And CPS Energy To Jointly Develop A Shared High-Speed Communications Wide Area Network" (MOU).

WHEREAS, the MOU established that CPS Energy had available dark fiber within the CPS Energy certificated service area that was not in use at the time and City had a need to increase its broadband capacity to meet the growing demand of the City for data and communication services used to conduct its daily business of municipal government.

WHEREAS, the Parties joined efforts to create a Shared High-Speed Communications Wide Area Network (the "Shared Network") that utilized CPS Energy's available dark fiber to expand broadband capacity for both Parties by creating separate private networks running over the same fiber facilities and compensated CPS Energy for its cost of service and actual costs of developing and maintaining components of the Shared Network.

WHEREAS, this Agreement does not waive or diminish the responsibilities of either Party under the MOU, except with regards to maintenance of fiber facilities to the extent of a conflict.

WHEREAS, it is the intent of the Parties that the City receive a perpetual indefeasible right to use no more than eight (8) strands of dark fiber, where available, installed and maintained by CPS Energy connecting its substations, including future fiber installations in exchange for the City granting to CPS Energy for the Term of the Agreement access to the City's communication towers and ground space, subject to availability, for the collocation by CPS Energy of wireless antenna equipment and facilities. The tower locations, type of equipment, and access will be mutually agreed upon by both entities prior to CPS Energy's installations.

WHEREAS, as additional consideration, City will grant CPS Energy for the Term of the Agreement use of four (4) strands of dark fiber on the City Fiber Route System, subject to availability.

NOW, THEREFORE, in consideration of the mutual promises set forth below, the receipt and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

1. DEFINITIONS

Except as hereinafter provided, terms used in this Agreement shall have their usual and customary meanings. Capitalized terms shall have the meanings set forth in this Article 1.

"Associated Property" means the Cable Accessories and Structures.

"Cable" means bundles of dark fiber that includes the Dark Fiber, and which is considered one of several components of the Network.

"Cable Accessories" means the attachment and suspension hardware splice closures and other components necessary either for the underground or overhead placement of the Cable, or for the continuity of the Cables within the Structures.

"Cable Parameters" means the operational standards of the Dark Fiber, which shall be based on current Building Industry Consulting Service International (BICSI) standards for Dark Fiber of the type installed in the Network.

1.5 **"City Fiber Route System"** means City owned dark fiber installed in different routes throughout the City of San Antonio as of the Effective Date, including future dark fiber installations routes, and subject to the terms and conditions established in this Agreement. The City Fiber Route System is set forth in Attachment F of the Agreement.

1.6 **"City Site"** means a City facility where a Demarcation Point is located and where Fiber-optic Equipment is interconnected with a Network Extension via Cross-Connect.

1.7 **"City Towers"** means the inventory of wireless towers on City property as of the Effective Date, which are owned by the City, including future wireless towers on City property meeting the same criteria. The current inventory of City Towers is set for in Attachment E of the Agreement.

1.8 **"Cross-Connect"** means an optical cross-connect panel at a Demarcation Point where a Network Extension terminates and interconnects with Fiber-optic Equipment.

1.9 **"Dark Fiber"** means no more than eight (8) strands of "dark fiber" which are individual strands of fiber optic glass within CPS Energy's core transmission fiber paths throughout the Network as of the Effective Date, including future dark fiber installations, and subject to the terms and conditions established in this Agreement. The Dark Fiber dedicated for the exclusive use of the City is part of the Cable that makes up the Network.

1.10 **"Demarcation Point"** means the point of demarcation and interconnection between a City Site and the Network that takes place at a Cross-Connect located at a City Site. The Cross-Connect marks the exact point of demarcation where a Network Extension terminates. The Network Side of the Demarcation Point spans from the point where the Network Extension connects at the Cross-Connect panel to the CPS Energy substation where the Network Extension connects to the Dark Fiber within the Network, for which CPS Energy has all responsibility for obtaining and preserving all Required Rights, providing maintenance, repair, relocation and

splicing activities, and for carrying out all other CPS Energy obligations as set forth in this Agreement. The Premise Side of the Demarcation Point spans from the point where the Fiber-optic Equipment connects at the Cross-Connect panel to all communications devices connected to the Fiber-optic Equipment located at City facilities, and may include dark fiber connections from the City Site to other governmental entities for which the City bears all responsibility.

1.11 **"Effective Date"** means the date stated in the first paragraph of this Agreement.

1.12 **"Fiber-optic Equipment"** means the equipment necessary to transport data over the Dark Fiber and consisting of active electronics, optoelectronics, and passive optical components together with security housing and electrical supply.

1.13 **"Indefeasible Right of Use"** or **"IRU"** means a form of acquired capital in which City possesses an exclusive and irrevocable right to use the Dark Fiber, together with use of the Associated Property of CPS Energy, for the entire Term. Such right of use includes access to Structures and Cable Accessories for the installation of Network Extensions.

1.14 **"Network"** means the Routes, the Cable, the Structures, and the Associated Property that make-up the Network as identified in Attachments A, B, and C, including but not limited to the core transmission fiber paths and future dark fiber installations to the Network.

1.15 **"Network Extension"** means a dark fiber connection installed at the City's request and running from the Demarcation Point at a City Site to a CPS Energy substation communications building where the Network Extension connects to Dark Fiber.

1.16 **"Network Side"** has the meaning set forth in Article 1.10.

1.17 **"Premise Side"** has the meaning set forth in Article 1.10.

1.18 **"Required Rights"** means any agreement, conveyance, easement, license, franchise or permit obtained by CPS Energy from a government entity or any third party, governing the terms under which CPS Energy may access and use public rights-of-way, private property, Structures and other property in order to use, install, construct and maintain Cable, Cable Accessories, and Structures. This Agreement does not convey any property interests in Required Rights to City or any third parties.

1.19 **"Route"** means core transmission fiber paths of the Network in which the Dark Fiber is or will be constructed and installed between the agreed upon substations embedded within the Cable.

1.20 **"Scheduled Maintenance"** means preventive maintenance of the Network, Dark Fiber, and Network Extensions, such as patrolling the CPS Energy Routes regularly and performing routine maintenance on signs, ducts, pole attachments and other facilities, plus enrolling in all applicable "dig safe" programs and responding to all locating and marking requests.

1.21 **"Structures"** means towers, poles, conduit, manholes, hand holes, splice cases, and associated civil works on or in which the Cable is located.

1.22 **"Term"** shall have the meaning set forth in Article 6.1.

1.23 **"Unscheduled Maintenance"** means any repair, restoration or relocation of the Dark Fiber, Network Extensions, or associated segments of the Network, other than Scheduled Maintenance.

2. AGREEMENT

2.1 **Agreement.** CPS Energy hereby grants City, and City hereby accepts, an Indefeasible Right of Use of the Dark Fiber, which is part of the Network as identified in Attachments A. The Dark Fiber to which the City will have exclusive right of use consists eight (8) strands of dark fiber, where available, in approximately seventy-five (75%) of the Routes between substations and four (4) strands of dark fiber in approximately twenty-five (25%) of the Routes between substations. The location and number of strands of Dark Fiber by Route connecting substations throughout the Network which are exclusively dedicated to City are identified in Attachment B. In this Agreement, Network Extensions as of the Effective Date include all City Sites identified as part of the modified Alpha and Bravo fiber rings, as well as preexisting City Sites identified in Attachment C. CPS Energy is responsible for the completion of all Network Extensions associated with the modified Alpha and Bravo rings pursuant to separate agreement. A list and map of the Network Extensions is incorporated as Attachment C. City shall be free to engage in any interconnections of the Network by requesting new Network Extensions. City may interconnect from the Premise Side of Demarcation Points to other governmental entities with dark fiber connections for its daily conduct of governmental business to the extent statutorily permissible, and shall have access to Structures and Cable Accessories necessary for the installation of such dark fiber connections. Interconnection between City Sites and the Network shall take place at Demarcation Points located at City Sites consistent with the network diagram included as Attachment D.

2.2 **Nature of the Agreement.** The Agreement grants the City exclusive use of the Dark Fiber for the Term of the Agreement, but does not convey legal title of the Dark Fiber, nor does it convey any legal title to the real property in, on, and/or upon which the Dark Fiber is installed. Concerning Network Extensions, the Parties agree that the City shall pay for their installation cost and will have indefeasible and exclusive right of use to their entire dark fiber capacity. However, CPS Energy will manage the Network Extensions as part of the Network and have responsibility for their installation and maintenance as set out in this Agreement.

2.3 **City Grant to CPS Energy**. In exchange for CPS Energy granting City the indefeasible right to use the Dark Fiber, City grants CPS Energy for the Term of this Agreement access to City Towers at no expense for the purpose of collocating wireless antenna equipment and base station facilities. Collocation access shall be granted based on availability and mutual agreement of collocation terms. City's inventory of City Towers as of the Effective Date is included as Attachment E. As addition consideration and subject to availability, City grants to CPS Energy at no cost access to four (4) strands of dark fiber on City Fiber Route System as identified in Attachment F.

3. DARK FIBER ACCEPTANCE TESTING

3.1 **Acceptance Testing.** Prior to the City accepting completion of Network Extensions, CPS Energy will perform two "Fiber Acceptance" tests. The first test is a bidirectional test that tests the fiber wave length at 1310 and 1550 and produces a report showing total loss at each wavelength. The test also indicates and reflects events at splice locations or possible microbends along the path. The second test is the Optical Time-Domain Reflectometer (OTDR) shot that provides accurate length of the cable and helps in calculating loss. City will accept the Dark Fiber and Network Extensions from CPS Energy once the "Fiber Acceptance" tests have been performed successfully in accordance with industry standards. Attachment G sets forth details for these two "Fiber Acceptance" tests.

4. USE OF DARK FIBER AND ACCESS TO THE NETWORK

4.1 **City's Rights of Use.** City acknowledges and agrees that the Dark Fiber and Network are for use by City solely for governmental, non-commercial purposes. The network diagram depicted in Attachment D illustrates the connectivity between City Sites and the Network which is subject to the following terms and conditions.

4.1.1 City's indefeasible right to use the Dark Fiber, and the Parties' rights and obligations concerning Network Extensions are outlined in Article 2.1. City shall not have access to the Network Side of Demarcation Points and CPS Energy shall not have access to the Premise Side of Demarcation Points.

4.1.2 All Demarcation Points for Network Extensions will be located at City Sites where City will be responsible for providing space for Cross-Connects. City shall bear all costs of the construction of the Premise Side of each Demarcation Point.

4.1.3 City shall be responsible for paying the construction cost of Network Extensions each of which spans from the Network Side of a Demarcation Point to a CPS Energy substation communications building. CPS Energy will be responsible for the construction of Network Extensions and will manage the underlying fiber facilities as part of the Network; however, the entire fiber capacity of the Network Extensions will be indefeasibly and exclusively dedicated to the City.

4.1.4 CPS Energy shall maintain the Network Extensions, Dark Fiber, and Network, including the CPS Energy core transmission fiber paths between CPS Energy substations at no cost, expense, rental, and/or any other remuneration to City. 4.1.5 The Parties acknowledge that the City is free to interconnect City Sites to other government entities with fiber connections as allowed by state law. In establishing those fiber connections, the City shall have access to Structures and Cable Accessories. Construction of such fiber connections shall be the sole responsibility of the City. 4.1.6 The Parties agree that any interconnection between the City and other governmental entities at City Sites will be for the purpose of City providing the eligible governmental entities access to its City operated fiber-optic communications network, not for providing access to individual strands of CPS Energy dark fiber.

4.2 **Dark Fiber Transfers Prohibited.** City will not permit or provide access to the Dark Fiber as strands of dark fiber to any private non-governmental third party, whether by lease, license, sublicense, indefeasible right of use, sale, resale, or any other form of transfer, trade, swap, disposition or agreement.

4.3 **Connections.** The Network Extensions and Demarcation Points established as of the Effective Date are listed and depicted in Attachment C. City may request additional Network Extensions under this Agreement through the NOC process and guidelines as set by the MOU, provided the Demarcation Points are located at City Sites and subject to the number of strands of Dark Fiber specified in Article 2.1 that are available within a Route connecting CPS Energy substations.

4.4 **City's Premise Side Responsibility.** At all authorized Demarcation Points located at City Sites, the City shall pay for, install, construct, maintain, and otherwise be responsible for all Fiber-optic Equipment on the Premise Side of the Demarcation Points. City will install a Cross-Connect panel at each Demarcation Point and make panel space available to CPS Energy on the Network Side of the Cross-Connect at no cost, expense, rental, and/or any other remuneration.

4.5 **Unauthorized Access/Limitation of City.** City shall not access any part of the Network without the prior written consent of CPS Energy, and then only upon the terms and conditions specified by CPS Energy. City shall not, by itself or through any employee, contractor, or agent, make any repair, replacement, alteration or modification to any portion of the Network or any other equipment or facilities in the Route or to the Network.

4.6 **Establishment of Demarcation Points.** The Parties agree to establish each new Demarcation Point at a City Site where a Network Extension will terminate at a Cross-Connect. The Parties further agree that the Network Operations Committee ("NOC") created pursuant to the MOU will establish technical protocols to test and ensure throughout the Term the continued and effective functioning of the interconnection between the Fiber-optic Equipment on the Premise Side and Network Extensions and the Network on the Network Side.

4.6.1 City will make available to CPE Energy at its City Sites appropriate conditioned space for establishing Demarcation Points, including the installation of Cross-Connects where Network Extensions will terminate.

4.7 **Development of Interconnection and Infrastructure Plans by the Parties.** The Parties agree that the NOC will develop access procedures for CPS Energy interconnection with City Fiber Route System. In addition, the Parties will share their ongoing plans for development of the new fiber routes, tower construction, and construction of any new substations. This will allow the Parties to seek access to each other's available assets.

4.8 **No Adequate Remedy at Law.** City recognizes that breach of any provision of this Article 4 may cause CPS Energy irreparable injury for which damages would be impossible to calculate. Accordingly, City hereby consents to the entry of an injunction against any actual or imminent violation and an order for specific performance of the obligations herein.

5. PARTIES' MAINTENANCE OBLIGATIONS

5.1 **Maintenance Obligations.** Each Party shall be responsible for the maintenance of its own dark fiber facilities as set out in this Article 5. Notwithstanding any provisions in the MOU related to the maintenance of the Joint Network, to the extent there is any conflict between the MOU and this Agreement related to the maintenance of dark fiber, the Parties agree that the provisions of this Article 5 will supersede and control the Parties' maintenance obligations concerning Network Extensions, Dark Fiber, and the Network.

5.2 **CPS Energy's Network Maintenance Obligations.** CPS Energy shall have the sole obligation and right to maintain and repair the Network, including the Network Extensions, the Dark Fiber, the Cable, and the Cable Accessories. CPS Energy shall maintain and repair, or cause to be maintained and repaired, the Network in good operating condition and pursuant to the Cable Parameters, all applicable manufacturer's specification, industry standards, building, construction and safety codes, as well as any and all other material, applicable governmental laws, statutes, rules, regulations, codes and ordinances.

5.3 **Scheduled and Unscheduled Maintenance.** CPS Energy shall provide, at no cost to City, all Scheduled and Unscheduled Maintenance of the Network, Dark Fiber, and Network Extensions throughout the Term of the Agreement with one exception. City shall bear the cost of Unscheduled Maintenance where City staff or contractors are responsible for causing damage to the Network, Dark Fiber, or a Network Extension triggering an Unscheduled Maintenance event. Where an Unscheduled Maintenance event is caused by a third party at no fault of City, CPS Energy shall promptly address the Unscheduled Maintenance event at its own expense following procedures established by the NOC.

5.4 **Response to Unscheduled Maintenance.** The Parties shall respond to Unscheduled Maintenance event as follows:

5.4.1 The Parties shall respond to any event giving rise to the need for Unscheduled Maintenance within the time parameters established by the NOC. With respect to any Unscheduled Maintenance involving an outage of fiber-optic or radio tower infrastructure, the Parties shall acknowledge the receipt of the trouble call within two (2) hours and have maintenance personnel at the site of the problem within four (4) hours of receiving notification of the problem. The Parties shall use commercially reasonable efforts to complete any Unscheduled Maintenance involving an outage within sixteen (16) hours after the appropriate repair crews arrive at the problem site, or other time window established by the NOC. The repair activity shall restore service promptly, and such activity may include a temporary repair if determined to be appropriate. Permanent repairs will take place as soon as practical after the temporary repair is complete.

5.4.2 In case of Unscheduled Maintenance, the Parties will act to protect the public health and safety of citizens and to protect public and private property, notwithstanding any provision in this Agreement. The Parties will make every reasonable effort to coordinate emergency response activities. To that end, the City will use the following emergency contacts:

Level One Contact: City will contact CPS Energy's Network Operations Center, which is available 24/7, and will alert CPS Energy's Senior Director – Communications Services & Infrastructure.

Level Two Contact: In the event CPS Energy's Network Operations Center cannot be reached, or the Network Operations Center staff cannot address the emergency situation, the City will contact CPS Energy's Vice President and Chief Information Officer.

Level Three Contact: In the event the emergency situation calls for a coordinated effort between the City and CPS Energy's management team, the City will contact CPS Energy's Senior Vice President & Chief Administrative Officer.

CPS Energy will maintain its emergency contact information current at all times with the City Chief Information/Technology Officer.

To that end, CPS Energy will use the following emergency contacts:

(a) Level One Contact: CPS Energy will contact City's Network Operations Center, which is available 24/7, and will alert City's ITSD, Senior IT Manager.

Level Two Contact: In the event City's Network Operations Center cannot be reached, or the Network Operations Center staff cannot address the emergency situation, CPS Energy will contact City's ITSD, Assistant Director over Infrastructure.

Level Three Contact: In the event the emergency situation calls for a coordinated effort between the City and CPS Energy's management team, CPS Energy will contact City's Chief Information/Technology Officer.

City will maintain its emergency contact information current at all times with the CPS Energy Senior Vice President & Chief Administrative Officer.

5.5 **Changes to Network, Cable, and Cable Accessories.** CPS Energy may make such changes and/or alterations to the Network, the Cable, or the Cable Accessories as CPS Energy determines are necessary or advisable in its sole discretion. CPS Energy shall bear all costs of such changes and alterations, except that any changes and/or alterations to the Network, the Cable, or the Cable Accessories made to comply with local, state, and/or federal rules, regulations, and/or requirements shall comply with those local, state, and/or federal rules, regulations, and/or requirements, including the rules, regulations, and/or requirements that address the costs of such changes and/or alterations.

5.6 **Notice of Damage.** The Parties shall promptly notify each other by telephone and electronic mail of any matters pertaining to any damage or impending damage to or loss of the use of Network Extensions, Dark Fiber, radio systems, and/or the Network that are known to it and that could reasonably be expected to adversely affect operation

5.7 **City Maintenance Obligations.** City will engage in preventive maintenance activities of the City Fiber Route System, tower infrastructure, and facilities as prescribed by the NOC.

5.8 **Development of NOC Technical Standards.** The NOC shall be responsible for developing and updating industry standard procedures applicable to both Parties for: (1) fiber installations; (2) network maintenance; (3) tower and shelter maintenance; (4) system testing; (5) network trouble shooting; (6) outage restoration; (7) vendor contacting; and (8) any other technical matters related to implementation of this Agreement.

6. TERM

6.1 **Term.** The term of the Agreement shall commence on the Effective Date and shall be for the useful life of the CPS Energy fiber Network, the City Fiber Route System and City tower locations. It is intent of the Parties that the Agreement will be perpetual in nature.

7. RELOCATION, CONDEMNATION, AND EMINENT DOMAIN

7.1 **Required Work.** If CPS Energy is required to relocate all or any portion of the Network containing the Dark Fiber by the Required Rights, public authorities, or lawful order or decree of a regulatory agency or court, CPS Energy shall perform such work in compliance with prevailing industry standards.

7.2 **Payment of Relocation Costs.** CPS Energy shall bear the full cost for relocation of Network components, including Dark Fiber that may be a result of the provisions of this Article, except that any relocation of Network components, including Dark Fiber, made to comply with local, state, and/or federal rules, regulations, and/or requirements shall comply with those local, state, and/or federal rules, regulations, and/or requirements, including the rules, regulations, and/or requirements that address the costs of such relocation of Network components, including Dark Fiber.

7.3 **Relocation Procedures.** CPS Energy shall provide City with prior written notice of any relocation undertaken pursuant to Article 7.1, with such notice provided in no less than thirty (30) days in advance of the event, except in cases of emergency or when less notice is received from a third party having the right to order relocation of the affected Network components.

8. CPS ENERGY ACCESS TO CITY TOWERS AND CITY FIBER ROUTE SYSTEM

8.1 **CPS Energy Access to City Towers.** In exchange for CPS Energy granting City the indefeasible right to use the Dark Fiber, City grants to CPS Energy, for the Term of this Agreement, indefeasible access to the City's Frio Tower and ground space, located at 515 Frio, San Antonio, TX 78207 for the purpose of collocating wireless antenna equipment and facilities. In addition, CPS Energy shall have access to tower and ground space on City Towers as specified in Article 2.3 for the purpose of collocation. Such access by CPS Energy to the Frio Tower in particular, and to City Towers in general, shall be at no cost, no expense, no rental, and/or no remuneration to CPS Energy.

8.2 **CPS Energy Access to City Fiber Route System.** As additional consideration to CPS Energy under this Agreement, City grants CPS Energy access to the City Fiber Route System as specified in Article 2.3 at no cost, expense, rent, or remuneration for the Term of the Agreement.

8.3 **Development of NOC Access Procedures.** The Parties agree that the NOC will develop access procedures for collocation on City Towers and for interconnection with City Fiber Route System.

9. DISCLAIMERS AND LIMITATION OF LIABILITY

9.1 **DISCLAIMERS.** OTHER THAN AS EXPRESSLY SET FORTH IN THIS AGREEMENT, CPS ENERGY MAKES NO WARRANTIES, REPRESENTATIONS, COVENANTS OR GUARANTEES IN CONNECTION WITH THIS AGREEMENT, THE NETWORK, OR DARK FIBER WHETHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EITHER PARTY BE LIABLE TO THE OTHER, WHETHER IN CONTRACT, TORT, OR OTHERWISE, INCLUDING STRICT LIABILITY, FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR ANY LOST BUSINESS DAMAGES IN THE NATURE OF LOST REVENUES, PROFITS AND/OR GOODWILL, REGARDLESS OF THE FORESEEABILITY THEREOF.

9.2 **NO REPRESENTATIONS. CPS ENERGY MAKES NO REPRESENTATIONS WITH RESPECT TO THE DARK FIBER AND/OR THE NETWORK, EXCEPT AS SPECIFICALLY SET FORTH HEREIN. EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, CPS ENERGY SHALL NOT HAVE ANY LIABILITY WHATSOEVER FOR, OR IN CONNECTION WITH FAILURE OF THE DARK FIBER AND/OR THE NETWORK.**

9.3 City will hold CPS Energy harmless from any legal action associated with the use by the City of the Dark Fiber, which are part of the Network, pursuant to this Agreement. With regard to other governmental entities that may establish their own fiber connections to City Sites, the inter-local agreements between the City and such other governmental entities controlling the nature of such interconnection shall include provisions that indemnify and hold harmless CPS Energy against any liability resulting from such interconnection.

10. DEFAULT AND CURE

10.1 **DEFAULT AND CURE. A PARTY SHALL BE IN DEFAULT UNDER THIS AGREEMENT IF SUCH PARTY FAILS TO PERFORM OR COMPLY WITH ANY OBLIGATION, TERM, CONDITION OR PROVISION OF THIS AGREEMENT, AND SUCH FAILURE CONTINUES FOR MORE THAN THIRTY (30) DAYS AFTER SUCH PARTY RECEIVES WRITTEN NOTICE OF SUCH FAILURE FROM THE NON-DEFAULTING PARTY; PROVIDED, HOWEVER, THAT IF SUCH DEFAULT CANNOT REASONABLY BE CURED WITHIN SUCH THIRTY-DAY (30) PERIOD AND IF THE FIRST PARTY IS PROCEEDING PROMPTLY AND WITH DUE DILIGENCE IN CURING THE SAME, THE TIME FOR CURING SUCH DEFAULT**

SHALL BE EXTENDED FOR A REASONABLE PERIOD OF TIME, AS NECESSARY TO COMPLETE SUCH CURING. DEFAULT UNDER THIS ARTICLE 10 SHALL NOT RESULT IN TERMINATION OF THE AGREEMENT

11. NOTICE

11.1 **Notice Addresses.** Unless otherwise provided in this Agreement, all notices and communications concerning this Agreement shall be in writing to the following:

City of San Antonio
Chief Information/Technology Officer

515 Frio

San Antonio, TX 78207

CPS Energy
Enterprise Information Technology
P.O. Box 1771
San Antonio, TX 78296

CPS Energy
Senior Vice President &
Chief Administrative Officer
P.O. Box 1771
San Antonio, TX 78296

12. RELATIONSHIP OF THE PARTIES

12.1 **Relationship of the Parties.** The relationship between CPS Energy and City shall not be that of partners, agents, or joint venturers for one another, and nothing contained in this Agreement shall be deemed to constitute a partnership or agency agreement between them for any purposes, including federal income tax purposes.

13. FORCE MAJEURE

13.1 **Force Majeure Event.** Notwithstanding anything contained herein to the contrary, neither City nor CPS Energy shall be liable for any failure or delay in performing its obligations hereunder, or for any loss or damage resulting therefrom, due to the following Force Majeure Events:

(a) an act of God, a natural disaster or act of war (including terrorism), civil emergencies and labor unrest or strike, untimely delivery of equipment, pole hits, and unavailability of essential equipment, services and/or materials, or

(b) an explosion, fire or other casualty or accident, which is not the result of gross negligence, an intentional act or misconduct on the part of either Party.

14. ASSIGNMENT

14.1 **No Assignment.** Agreement shall not be assigned, transferred, sold or disposed of, by City in whole or in part, by voluntary sale, merger, consolidation, or otherwise by force or involuntary sale, without the expressed written consent of CPS Energy.

14.2 **Binding Effect.** This Agreement shall be binding upon and inure to the benefit of the Parties hereto, their successors and assigns.

15. AMENDMENT

15.1 **Amendment to Agreement.** This Agreement may only be amended in writing by the mutual consent of the Parties. Any proposed amendment must be brought before the NOC in writing for discussion and consideration. Under the terms of this Agreement, the NOC has the authority to develop procedures and technical standards to implement various obligations of the Parties. Only in the event that the concerns of the Parties cannot be addressed through the development of procedures and/or technical standards will the Parties proceed to negotiate amendment of the Agreement.

IN CONSIDERATION THEREOF, and with intent to be bound, the Parties have caused this Agreement to be executed by their duly authorized representatives.

CPS ENERGY

By: John L. Benedict

Print Name: JOHN L. BENEDICT

Title: SR. VP & CAO

Date: 9-5

THE CITY OF SAN ANTONIO, TEXAS

By: _____

Print Name: _____

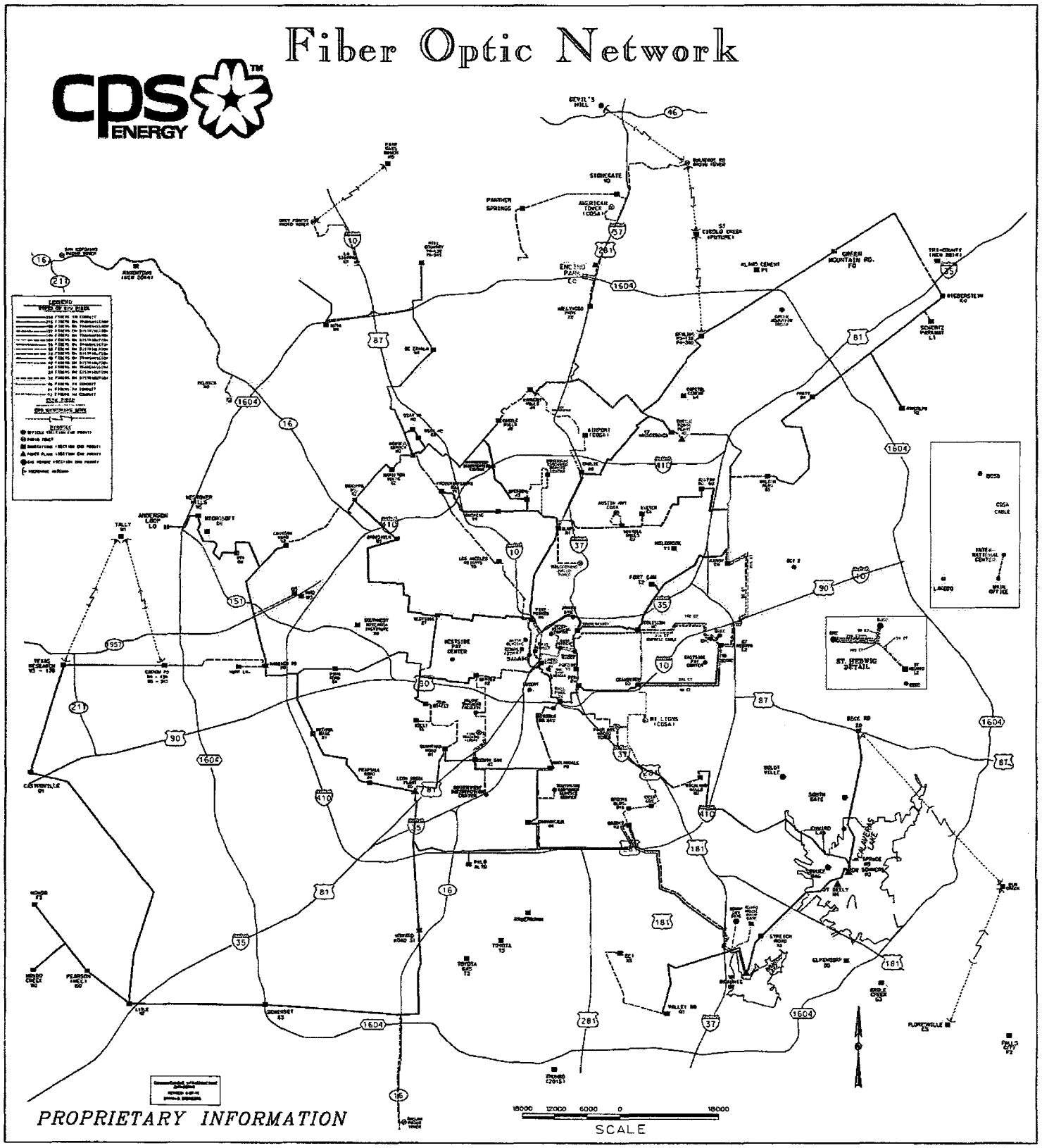
Title: _____

Date: _____

AGREEMENT ATTACHMENT A

Map of CPS Energy Fiber Network Footprint

Fiber Optic Network



PROPRIETARY INFORMATION

AGREEMENT ATTACHMENT B

CPS Energy Fiber Routes Identifying the Number of Fiber Strands Dedicated to City

FIBER STRANDS DEDICATED TO CITY	CPS ENERGY FIBER ROUTE SEGMENT

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AGREEMENT ATTACHMENT B

CPS Energy Fiber Routes Identifying the Number of Fiber Strands Available Today 08/28/14

The Fiber Strand Availability Will Vary Depending on Damage and Business Needs

Fiber Strands Availability at point in time 08/28/14	Cable #	STATION FROM	STATION TO
8	10018	Jones	Tenth St
8	10019	Navarro Com	Tenth St
8	10020	Laredo	Main Office
8	10021	Five Points	Laredo St
8	10022	Five Points	Jones
8	10027	Five Points	Olmos
8	10044	Ball Park	Laredo St
8	10045	Ball Park	MRCC
8	10046	Ball Park	Fair
8	10050	Laredo	Merida
8	10077	Fern	Grandview
8	10078	Ball Park	Fern
8	10080	Five Points	Westside
8	10081	Five Points	LA Heights
2	10111	Five Points	Salado St.
8	10222	Five Points	515 Frio CS
8	10221	Laredo St	515 Frio CS
4	10112	Laredo St	Salado St.
8	10119	Intnl Center	Main Office
8	10205	Fern St LCH	Parson St. LCH
Removed	10130	Main Office	SAPD Radio BLG.
Removed	10131	SAPD	SAPD Radio BLG.
Removed	10132	BCSO	SAPD
8	10133	BCSO	Laredo St.
8	10141	Navarro Com	Main Office Comm
8	10143	Gugert	Ball Park
8	10151	Matamoros	Salado
4	10152	One Stop Center	Laredo St.
2	10153	One Stop Center	Ball Park
2	10009	Fratt	Parkway
8	10010	Randolph	Wiederstein
2	10011	Parkway	Wiederstein
8	10014	Fratt	Wiederstein
8	10023	Coliseum	Tenth St
8	10024	Coliseum	Ft Sam
8	10025	FT. Sam	Kirby
8	10026	Kirby	ST Hedwig #1
8	10224	St Hedwig	OCI #2
8	10225	OCI #2	Kirby
8	10232	Kirby	St Hedwig #2

8	10038	Fratt	Randolph
2	10040	Fratt	Wiederstein
8	10043	Fratt	Walzem Rd
8	10048	Exeter	Terrell Hills
4	10172	Skyline	Green Mountain Service
4	10173	Green Mountain	Green Mountain Service
8	10053	Green Mtn	Skyline
8	10065	Austin Rd	Kirby
8	10066	Austin Rd	Tuttle PP
8	10067	Kirby	Walzem Rd
8	10068	Tuttle PP	Walzem Rd
8	10076	Coliseum	Grandview
4	10167	Nacogdoches	Capital Cement (L4 CS)
4	10230	Skyonics (L4 LCH)	Capital Cement (L4 CS)
4	10231	Nacogdoches	Skyonics (L4 LCH)
Removed/Deleted	10098	Nacogdoches	Tuttle PP
8	10104	Nacogdoches	Skyline
8	10107	Coliseum	Kirby
4	10144	Austin Hwy COSA	Terrell Hills
4	10145	Austin Hwy COSA	Terrell Hills
4	10228	Green Mtn	Tri County
8	10154	Green Mtn	Wiederstein
4	10229	Tri County	Wiederstein
4	10202	Fort Sam	Holbrook
8	10206	Austin Rd	Exeter
8	10047	Fair	Highlands
8	10084	Grandview	ST Hedwig
8	10085	Highland Hills	Sommers
8	10166	Braunig	Elmendorf
8	10168	Elmendorf	Eagle Creek
8	10169	Eagle Creek	Floresville
4	10170	Floresville	Fall City
4	10171	Eagle Creek	Fall City
4	10176	Sommers	Southgate Gas
4	10177	Southgate Gas	Southeast Gas
4	10178	Southeast Gas	Spruce Gas
4	10179	Spruce Gas	Sommers
2	10086	Sommers	Streich Rd
2	10087	Braunig	Streich Rd
8	10088	Braunig	Valley Rd
8	10219	Valley Rd	OCI Alamo 1
8	10089	Braunig	Brooks Field
8	10090	Brooks	Chavaneaux
8	10105	Beck Rd	Sommers
0	10134	Grandview	Hylyons
0	10135	Fair CS	Hylyons
Removed/Deleted	10147	Eastside Customer SC	St. Hedwig
8	10155	EMC	St. Hedwig

8	10159	Coliseum	EMC
8	10001	Howard Rd.	Leon Creek
8	10015	Medina Base	Pinn Rd
8	10209	Mauermann Rd	Chavaneaux
8	10016	Medina Base	Pearsall Rd
8	10017	Leon Creek	Pearsall Rd
8	10039	Chavaneaux	Pala Alto
8	10223	Leon Creek PP	Pala Alto
8	10054	Chavaneaux	Harlendale
8	10055	Harlandale	So. San
8	10056	South San	SWSC
8	10057	Leon Creek	Quintana
8	10058	Quintana	So. San
8	10060	Kelly	Quintana
8	10070	Kelly	Pinn
8	10071	Kelly	Merida
8	10072	Merida	Westside
8	10073	Merida	Pinn
4	10163	Pinn	SW Research
4	10164	Westside	SW Research
8	10074	Pinn Rd	Westside
8	10079	Harlandale	MRCC
4	10106	Howard Rd	Somerset
8	10110	Kelly	Westside
4	20091	Toyota Gas	Toyota LCH
4	10165	Howard Rd	Toyota Gas
4	10162	Howard Rd	Toyota LCH
8	10117	Howard Rd	Thelma
8	10118	Somerset	Thelma
8	10129	Somerset CS	Lytle LCH
8	10136	Fire Training	South San
8	10137	Fire Training	Merida
8	10146	Harlandale CS	Southside Customer SC
8	10148	Howard Rd	Somerset CS (Dist)
8	10002	Cagnon	Helotes
8	10012	Cagnon	Marbach
8	10013	Marbach	Pinn
8	10049	Bandera	Grissom
8	10061	Grissom	Marbach
8	10062	Grissom	VTI
8	10063	Marbach	VTI
8	10091	Broadveiw	Bandera
8	10092	Broadveiw	Westside
2	10161	Bandera	Hamilton Wolf
2	10160	Hamilton Wolf	Medical
8	10093	Bandera	Medical
8	10099	Bandera	Helotes
8	10120	Hondo	Hondo Creek

8	10121	Hondo Creek	Lytle
4	10174	Pearson	Hondo
4	10175	Pearson	Lytle
4	10122	Hondo	Lytle
4	10123	Anderson Loop	Cagnon
4	10142	Merida	Westside Customer SC
4	10185	VTI	Microsoft (Phase #1)
4	10193	Marbach	TCC
4	10194	TCC	Grissom
4	10003	Helotes	UTSA
0	10004	Helotes	La Sierra
4	10005	La Sierra	UTSA
6	10006	Hill Country	La Sierra
8	10033	Medical	NWC
8	10035	Medical	USAA #2
8	10036	DeZavala	Medical
8	10037	Medical	USAA #1
8	10041	DeZavala	Hill Country
8	10042	DeZavala	UTSA
8	10064	Hill Country	UTSA
8	10082	Fred Rd.	LA Heights
8	10094	Fred Rd.	Medical
8	10100	USAA #1	USAA #2
8	10113	Grey Forest	La Sierra
8	10114	Helotes	San Geronimo
6	10124	Helotes	Anderson Loop[
8	10138	Airport	Chulie
4	10007	Encino Pk	Hill Country
4	10008	Encino Pk	Skyline
8	10028	Dresden	Olmos
8	10029	Buckeye	Dresden
8	10030	Buckeye	Olmos
8	10031	Dresden	NWC
8	10032	Castle Hills	NWC
8	10034	Castle Hills	Medical
8	10059	Chulie	Olmos
8	10075	Olmos	Terrell Hills
8	10083	Buckeye	Fred Rd
8	10095	Castle Hills	Harmony Hills
8	10096	Chulie	Harmony Hills
8	10097	Chulie	Nacogdoches
8	10101	Encino Pk	Hollywood Pk
8	10102	Harmony Hlls	Hollywood Pk
8	10103	Hollywood Pk	Skyline
8	10108	Harmony Hlls	Nacogdoches
8	10109	Hollywood Pk	Nacogdoches
8	10115	Bulverde	Encino Pk
8	10116	Hildebrand	Olmos

Not built	10139	Airport	Harmony Hills
2	10140	American Tower	Encino Pk
8	10149	Olmos	Northside Customer SC
8	10150	Dresden	Northside Customer SC
2	10156	Encino Pk	Stone Gate
4	10157	Bulverde	Stone Gate
6	10158	American Tower	Bulverde

AGREEMENT ATTACHMENT C

List and Map of City Sites Making Up the Alpha, Bravo, and Charlie Fiber Rings

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Agreement Attachment C

Preexisting Network Extensions

Below is the list of preexisting Network Extensions referenced in Section 2.1 of the Agreement. Prior to the execution of the Agreement, CPS Energy constructed fiber connections to the following City public safety radio towers with which the City's Information Technology Services Department operates an active SONET fiber ring to support mission critical network communication services.

a. Broadview Tower
b. Transguide
c. San Antonio International Airport
d. Austin Highway Tower
e. Topperwein (Fratt) Tower
f. South Breeze Tower
g. Hill Country Tower
h. Grey Forest Tower
i. Cagnon Road Tower
j. Zarzamora Tower
k. Hy Lyons Tower
l. Jones Ave Tower
m. Frio Tower
n. Frio Data Center
o. Brooks City Base (EOC) Data Center
p. International Building

The fiber connections to these City facilities constitute "Network Extensions" as the term is defined in Section 1.15 of the Agreement and are subject to all rights and obligations of the Parties regarding Network Extensions.

CPS Energy Station Fiber Counts

Alpha Ring Map

From Location	To Location	Cable Number	8 Fiber Strands
Five Points (M1) 111 N. Frio St. 78207	Jones Ave. (J13rd) 326 W Jones Ave. 78215	10022	yes
Jones Ave. (J13rd) 326 W Jones Ave . 78215	Tenth St (D0) 415 10th St. 78215	10018	yes
Fern St. (F4) 1303 Hoefgen St. 78210	Ball Park (Z4) 306 mission Rd. 78210	10078	yes
Ball Park (Z4) 306 Mission Rd. 78210	Fair 1418 Fair Ave.	10046	yes
Fair 1418 Fair Ave.	Higland Hills (Q2) 4325 SE Military Dr. 78232	10047	yes
South San (J0) 802 Somerset Rd.	Harlandale (P0) 130 W. Huff 78214	10055	yes
Harlandale (P0) 130 W. Huff 78214	Missio Rd. 303 Mission Rd.	10079	yes
Mission Rd 303 Mission Rd.	Ball Park (Z4) 306 Mission Rd. 78210	10045	yes
Ball Park (Z4) 306 Mission Rd.	Laredo (K3) 1012 S. Laredo St. 78204	10044	yes
Laredo St. (K3) 1012 S. Laredo 78204	515 Frio 515 Frio St.	10221	yes
515 Frio 515 Frio St.	Five Points (M1) 1111 N. Frio St. 78207	10222	yes

CPS Energy Station Fiber Counts

Bravo Ring Map

From Location	To Location	Cable Number	8 Fiber Strands	
Five Points (M1CS) 111 N. Frio St. 78207	Jones Ave. (J13rd) 326 W Jones Ave. 78215	10022	yes	
Five Points (M1CS) 111 N. Frio St. 78207	Laredo St. (K3CS) 1012 S. Laredo 78204	10021	yes	
Five Points (M1CS) 111 N. Frio St. 78207	Westside (E1CS) 366 N. San Joaquin	10080	yes	
Westside (E1CS) 366 N. San Joaquin	Pinn Rd (D4CS) 1950 Pinn Rd. 78227	10074	yes	
Westide (E1CS) 366 N. San Joaquin	Southwest Research (X4) 9495 W. Commerce St.	10164	NO	(cable is a 12 count, 4 strands currently in use, can offer 4 strands only)
Southwest Research (X4) 9495 W. Commerce St.	Pinn Rd. (D4CS) 1950 Pinn Rd. 78227	10163	NO	(cable is a 12 count, 4 strands currently in use, can offer 4 strands only)
Pinn Rd. (D4CS) 1950 Pinn Rd. 78227	Marbach (P2CS) 1818 Hunt Ln. 78251	10013	yes	
Marbach (P2CS) 1818 Hunt Ln. 78251	Grissom Rd. (Y2CS) 8250 Grissom Rd. 78251	10061	yes	
Grissom Rd. (Y2CS) 8250 Grissom Rd. 78251	Bandera Rd. (O2CS) 6351 Evers Rd. 78238	10049	yes	
Bandera Rd. (O2CS) 6351 Evers Rd. 78238	Hamilton Wolfe (G2LCH) 8465 Floyd Curl 78229	10161	NO	(cable is a 12 count, 8 currently in use, can offer 2 strands only)

Fiber Counts Bravo Ring Map (Continued)

From Location	To Location	Cable Number	Open Fiber	
Hamilton Wolfe (G2LCH) 8466 Floyd Curl 78229	Medical Center (M3CS) 4635 Hamilton Wolfe Rd.	10160	NO	(cable is a 12 count, 8 currently in use, can offer 2 strands only)
Medical Center (M3CS) 4635 Hamilton Wolfe Rd.	DeZavala Rd. (W4CS) 4150 Lockhill-Selma 78230	10036	yes	
DeZavala Rd. (W4CS) 4150 Lockhill-Selma 78230	Hill Country (T5CS) 18850 F.M. 1535 78257	10041	yes	
Hill Country (T5CS) 18850 F.M. 1535 78257	Encino Park (C0CS) 18845 Hwy. 281 N. 78258	10007	NO	(cable is a 20 count, 10 strands in use, can offer 4 strands)
Encino Park (C0CS) 18845 Hwy. 281 N. 78258	Skyline (P4CS) 4221 Jung Rd. 78217	10008	NO	(cable is a 24 count, 18 strands in use, can offer 4 strands only)
Skyline (P4CS) 4221 Jung Rd. 78217	Naogdoches (K3CS) 9911 Perrin Beitel Rd. 78217	10104	yes	
Naogdoches (K3CS) 9911 Perrin Beitel Rd.	Chulie (A0CS) 8110 Tim Ave. 78209	10097	yes	
Chulie (A0CS) 8110 Tim Ave. 78209	Olmos (H1CS) 5950 McCullough 78212	10059	yes	
Olmos (H1CS) 5950 McCullough 78212	Five Points (M1CS) 111 N. Frio St. 78207	10027	yes	

AGREEMENT ATTACHMENT D

Interconnection of City Sites with CPS Energy

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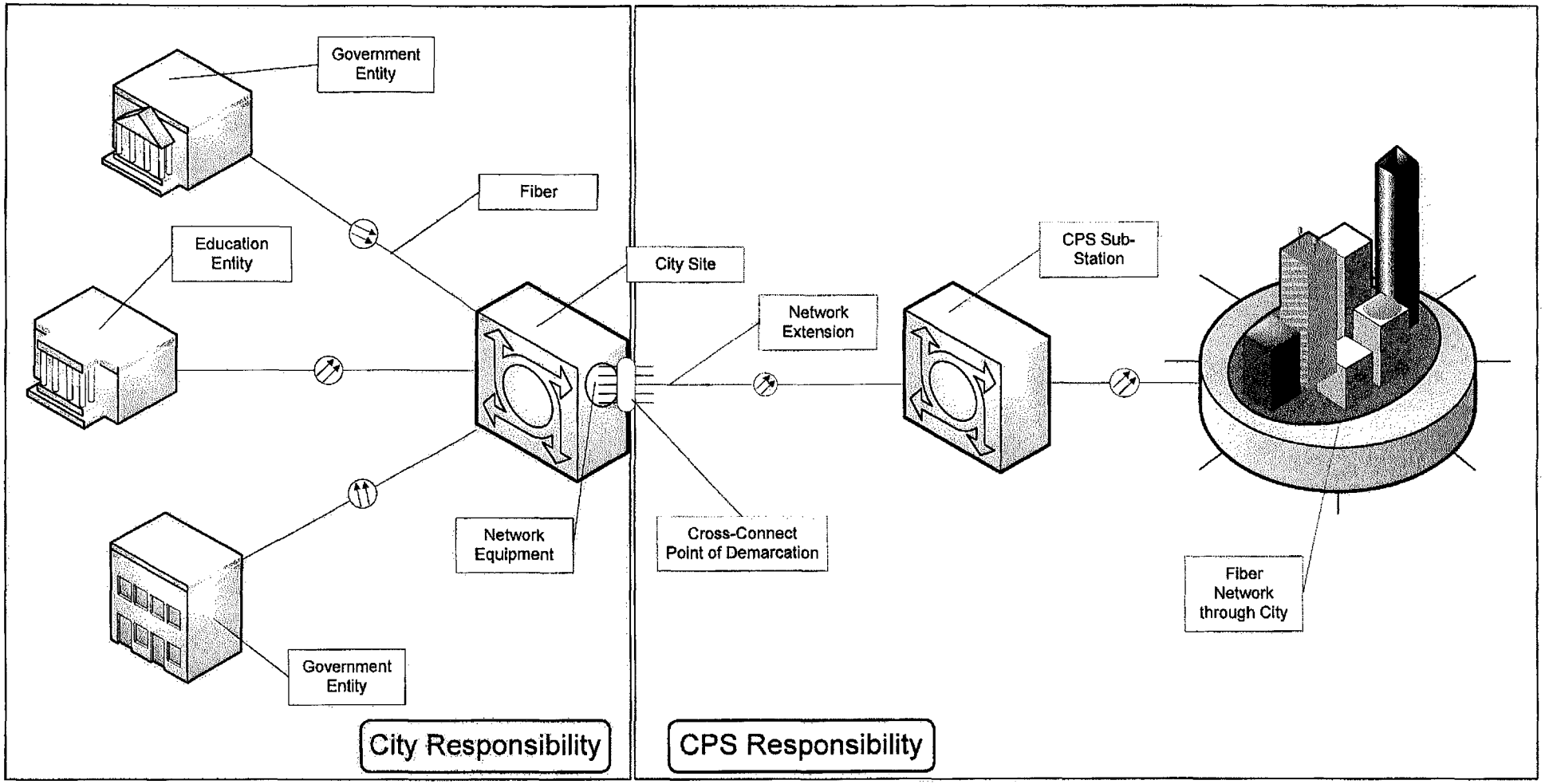
Interconnection of City Sites with CPS Energy



CITY OF SAN ANTONIO
NETWORK
OPERATIONS

Proprietary and Confidential

AGREEMENT ATTACHMENT E

Inventory of City Towers

Proprietary Information
Confidential Information

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Agreement Attachment E

Inventory of City Towers

Site Name	*Address*	*Tower Height*
Frio	515 South Frio	520 ft
Zarzamora	4531 S. Zarzamora	300 ft
Hy Lions	2000 Amanda Street	400 ft
Austin Highway	1051B Austin Highway	200 ft
Broadview	5227 Callaghan	400 ft
Cagnon	2200 Grosenbacher Road	400 ft

AGREEMENT ATTACHMENT F

Map of City Fiber Route System

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Confidential Information

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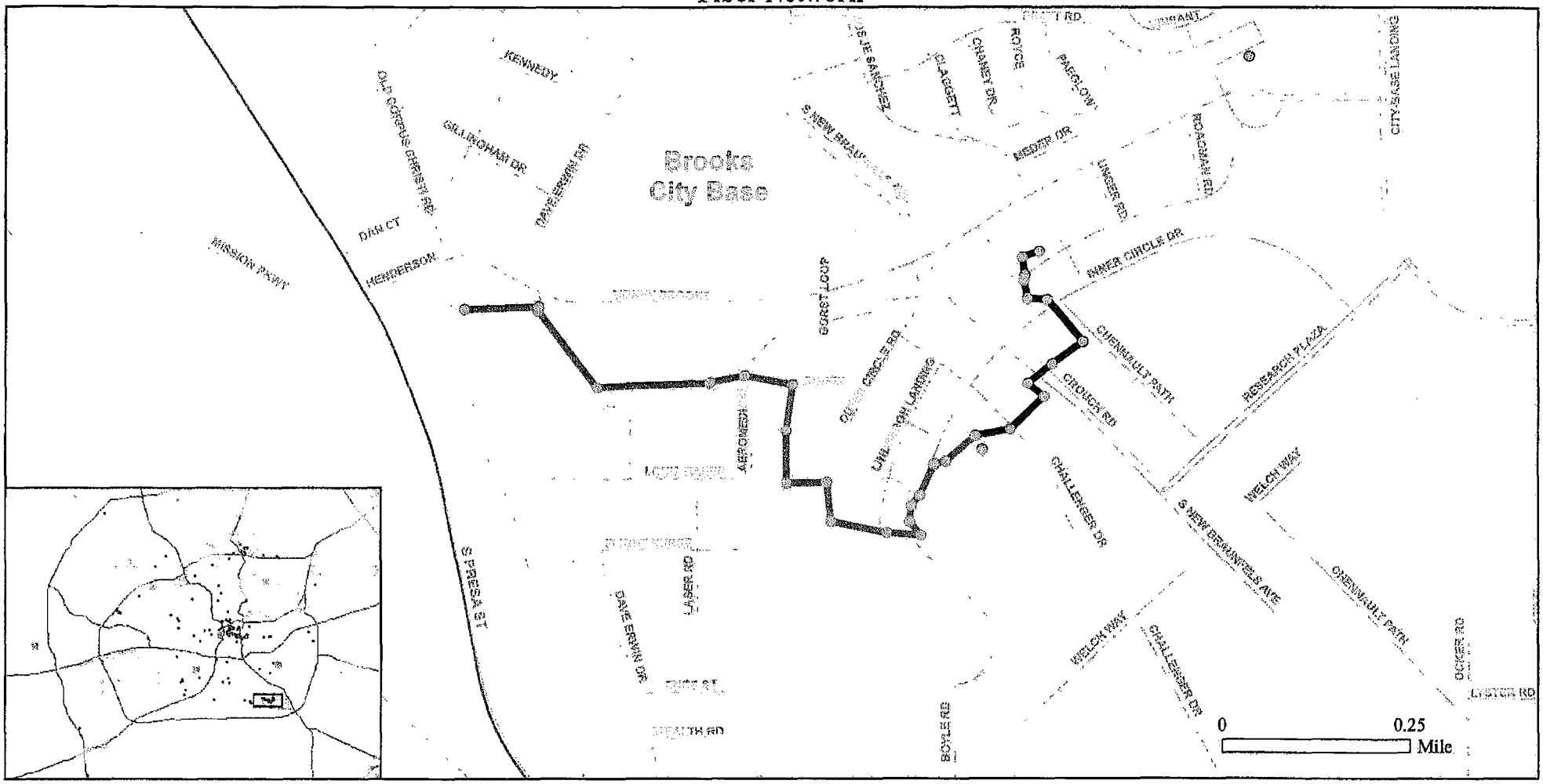
City of San Antonio
Fiber Network



City of San Antonio

Information Technology Services Department

August 2014

COSA Fiber Paths

- COSA Facility
- COSA Tower
- Brooks City Base

Brooks Campus

- EOC 619
- EOC 818

N W E S

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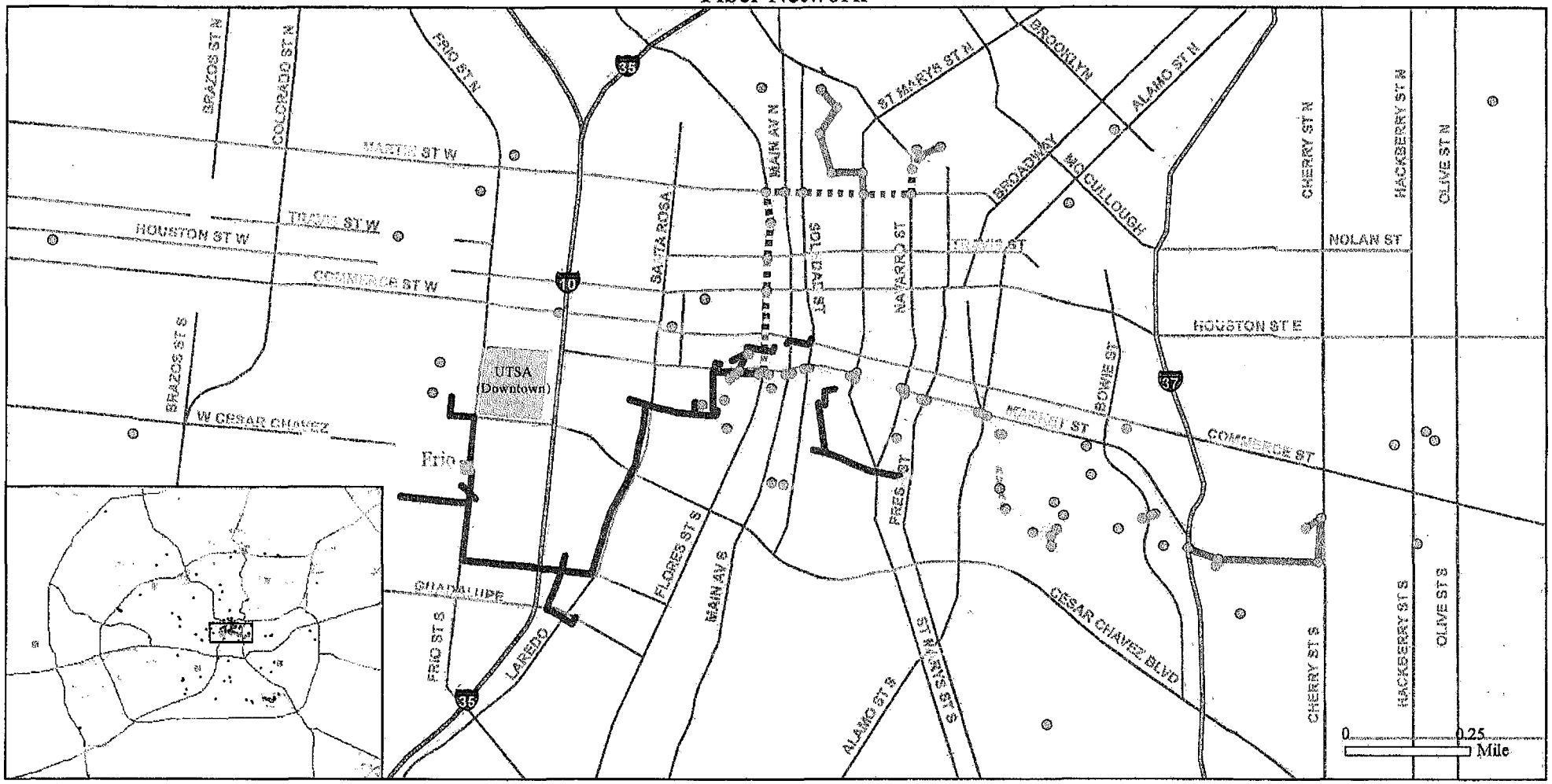
City of San Antonio
Fiber Network



City of San Antonio

Information Technology Services Department

August 2014

COSA Fiber Paths - Downtown

- COSA Facility
- COSA Tower
- Alamodome
- Central Library
- Convention Center
- Cherry St.
- Fire HQ
- Park Police
- Municipal Auditorium
- UG Fiber

N W E S

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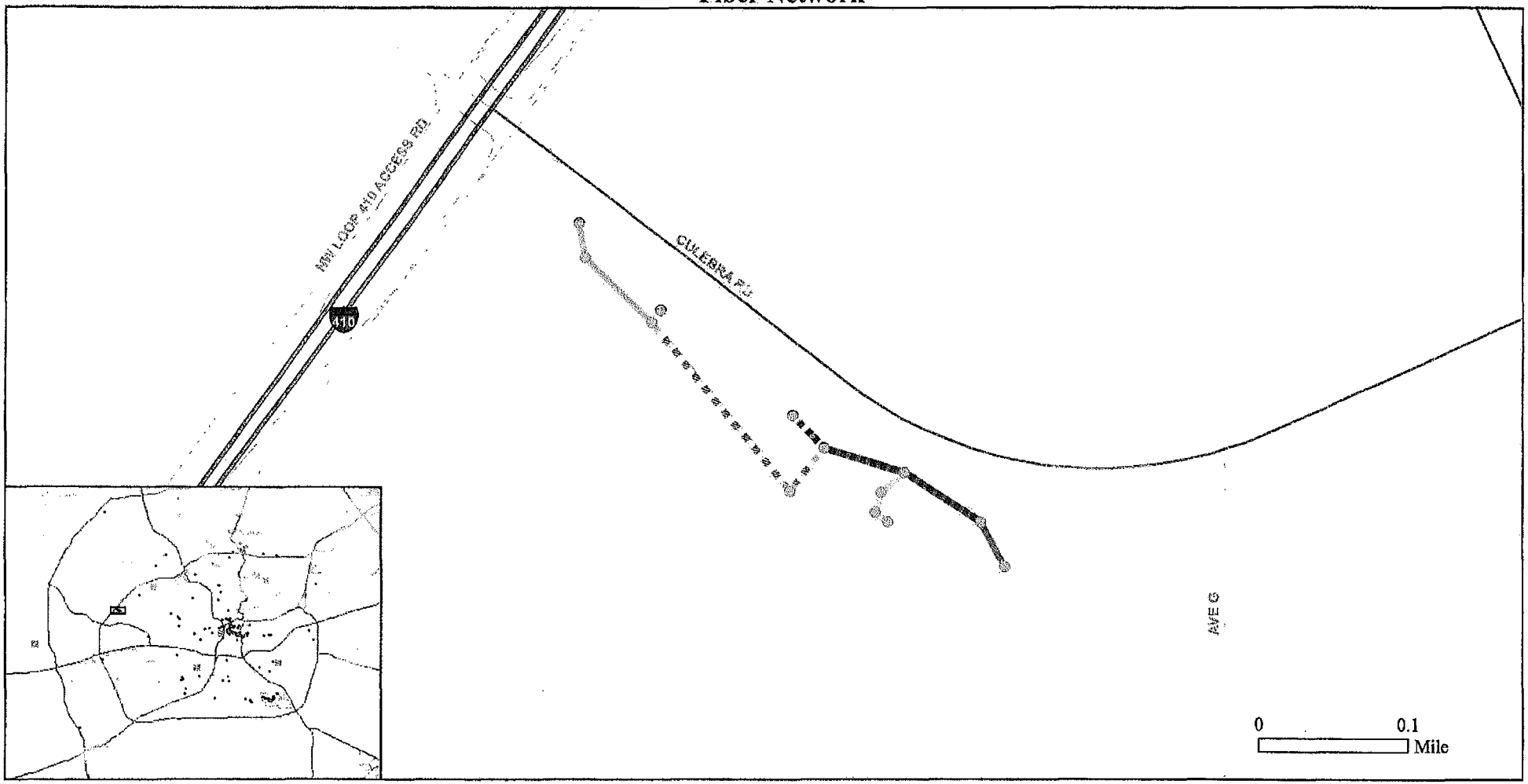
City of San Antonio
Fiber Network



City of San Antonio

Information Technology Services Department

August 2014

COSA Fiber Paths

COSA Facility
COSA Tower

NWSC Campus
Bunker
Fire Station

Hazardous Waste
Heavy Equipment
Portable

N
W E
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AGREEMENT ATTACHMENT G

Acceptance Testing Requirements for Network Extensions and Dark Fiber

General

After installation, test each fiber in all fiber optic cables for verification of proper installation. Perform the following tests:

a) Continuity testing to determine that the fiber routing and/or polarization is correct and documentation is proper.

b) End-to-end insertion loss using an OLTS power meter and source. Test multimode cables using TIA/EIA 526-14 Method B, and single mode cables using TIA/EIA 526-7 (single mode). Total loss shall be less than the calculated maximum loss for the cable based on appropriate standards or customer specifications.

c) Optional OTDR testing may be used to verify cable installation and splice performance. However, OTDR testing shall not be used to determine cable loss.

d) If the design documentation does not include cable plant length, and this is not recorded during installation, test the length of the fiber using the length feature available on an OTDR, or some OLTSs.

e) Chromatic Dispersion and Polarization Mode Dispersion test on fiber circuit paths that will utilize OC192/10 gig/ or Dance Wave Division Multiplexing (DWDM) type service; this is generally a pass or fail test done with EXFO test gear.

Continuity Testing

Perform continuity testing of optical fibers using a visual fiber tracer, visual fault locator, or OLTS power meter and source. Trace the fiber from end to end through any interconnections to insure that the path is properly installed, and that polarization and routing are correct and documented.

Insertion Loss

a) Insertion loss refers to the optical loss of the installed fibers when measured with a test source and power meter (OLTS). Test multimode cables using Teal 526-14 Method B, and single mode cables using TIA/EIA 526-7 (single mode). See Appendix B.

b) Test multimode fiber at 850 and 1300 nm, and single mode fiber at 1310 and 1550 nm, unless otherwise required by other standards or customer requirements.

c) Test reference test cables to verify quality and clean them often.

d) Cabling intended for use with high speed systems using laser sources may be tested with appropriate laser sources to ensure that tests verify performance with that type of source.

OTDR Testing

a) The optical time domain reflectometer (OTDR) uses optical radar-like techniques to create a picture of a fiber in an installed fiber optic cable. The picture, called a signature or trace, contains data on the length of the fiber, loss in fiber segments, connectors, splices and loss caused by stress during installation.

b) OTDRs are used to verify the quality of the installation or for troubleshooting. However, OTDR testing shall not be used to determine cable loss.

c) OTDR testing should only performed by trained personnel, using certified equipment designed for the purpose. The technicians performing the tests should be trained not only in operation of the OTDR equipment, but also in the interpretation of OTDR traces.

Optical Fiber Cabling

TIA/TSB-140 describes the methods by which optical fiber cabling is to be tested. An optical fiber cabling link may consist of a fiber or concatenated fibers (spliced, cross-connected or interconnected) with a connector or adapter on each end. The fiber type, link length, the number and quality of terminations and splices, cable stresses, and wavelength can all affect attenuation measurements.

Testing conducted on optical fiber cabling should be in accordance with a published standard. As noted in TIA/TSB-140, testing installed optical fiber cabling for attenuation with an OLTS, as described in cabling standards, and verifying the cabling length and polarity constitutes Tier 1 testing. Tier 2 testing, which is optional, includes the Tier 1 tests plus the addition of an optical time domain reflectometer (OTDR) trace. An OTDR trace can be used to characterize the installed fiber link. These traces provide an indication of the uniformity of cable attenuation, and indicate events along the fiber link. These events may be characterized as insertion loss associated with severe bends in a cable run, connector insertion loss and splice insertion loss.

Tier 1 criteria, as specified in TIA/TSB-140, constitutes conformance testing in accordance with this standard. The attenuation measurement result, using the Tier 1 criteria, shall be less than the designed attenuation budget (also known as loss budget) that is based on the number of terminations and cable length.

Test instruments

OLTS field test instruments for multimode optical fiber shall meet the requirements as specified in ANSI/TIA 526-14-A. OLTS field test instruments for single-mode shall meet the requirements as specified in ANSI/TIA 526-7. Additionally, the light source is to meet the launch requirements of ANSI/TIA 455 78B. This launch condition can be achieved either within the field-test instrument by the manufacturer, or by use of an external mandrel wrap applied to the source test jumper with a Category 1 Coupled Power Ratio (CPR) light source.

NOTE–Refer to ANSI/TIA 526-14-A for details on measuring source CPR.

The mandrel-wrap is installed on the transmit test jumper of an OLTS having an overfilled launch when it is used to measure the link loss of multimode fiber links. The installation of the mandrel wrap is performed by wrapping a length of fiber around a smooth round mandrel (rod) for a total of five (5) non-overlapping wraps. A mandrel wrap is never installed on the receive test jumper (optical power meter). Table 6 shows mandrel diameters for typical cabled fiber types.

NOTE – The mandrel diameters are based on nominal values of 20 mm and 25 mm reduced by the cable diameter and rounded up.

Performance parameters

OLTS field tests required for optical fiber cabling are as follows:

- Length
- Polarity
- Attenuation