CITY OF LONG BEACH

Memorandum

Date: March 4, 2021

To: Thomas B. Modica, City Manager

From: Lea D. Eriksen, Director of Technology and Innovation
Eric Lopez, Director of Public Works Department
John Keisler, Director of Economic Development

For: Mayor and Members of the City Council

Subject: **Update on Citywide Fiber Network Infrastructure Initiative**

This memorandum provides a recap of the City's High Tech Infrastructure Master Plan and an update on the Citywide Fiber Network Infrastructure Initiative.

Background

The High Tech Infrastructure Master Plan (Plan), announced in 2015, is one of five "Innovation and Economic Development" initiatives to be implemented by the City and community partners. Its aim is to maximize existing City assets, resulting in increased investment and quality Internet access for business and residents. As the City's data communication demands have continued to expand, several significant and transformative technology projects have been completed in the past two years:

1. Construction of the new Civic Center (City Hall, Main Library, and Port Headquarters).
2. Implementation of LB COAST Phase 1 (citywide Financial System that replaced a 30-year old legacy application).
3. Modernization of citywide network cameras.
4. Launch of new electronic documentation systems.
5. Upgrades of Internet bandwidth in the City's 12 libraries by 1,000 percent.

These modern technologies have significantly greater data communication demands than what is currently available at most City buildings. In some cases, the Technology and Innovation Department (TID) is estimating a three-fold increase in data throughput needs at many of the City's facilities. In addition, interest in additional Smart City applications (such as network cameras, public Wi-Fi, intelligent transportation, body-worn cameras, Citizens Broadband Radio Service [CBRS], and Smart Infrastructure) continue to grow. These demands emphasize the need for a high-speed fiber communications network throughout Long Beach. At the same time, the City is seeking to address historical inequity in digital infrastructure and attract greater private sector investments, including fiber, for all residents and businesses.

As part of the Plan's economic development initiative, TID worked with The Broadband Group (TBG) to complete an assessment of the City's fiber network infrastructure and its high-speed communication needs. In November 2017, TID sent to the City Council a high-level assessment

and recommendation to implement a fiber and underground conduit backbone network to interconnect City buildings and provide access for private Internet and Cellular Service to unserved and underserved areas (referred to as Scenario #1). The Plan also provided an outline, and associated costs, to a future pathway to connecting commercial buildings to fiber in identified economic development corridors (Scenario #2) and, eventually, all residences in Long Beach (Scenario #3).

On December 5, 2017, TID and the Financial Management Department presented to the City Council the City's Critical Needs in Technology program, which included the recommendation to interconnect City buildings and implement a citywide fiber backbone (Scenario #1). City Council approved the Critical Technology Infrastructure Needs program, directing City management to recommend purchases and financing in tranches.

Today, through ongoing investment, the City's existing fiber network infrastructure is approximately 60-miles in length, providing high-speed connectivity to about 25 percent of City facilities, as well as some network cameras, public Wi-Fi locations, and traffic signals. A map of the City's current fiber network can be found in Attachment A, and a list of City locations connected to the network can be found in Attachment B.

Citywide Fiber Network Infrastructure Initiative

The City has made steady progress in the design and planning of the Citywide Fiber Network Infrastructure that will interconnect City buildings to (1) save on current and future communication costs and establish a citywide fiber backbone that will enable the City to continue to grow (e.g., more bandwidth, future buildings), (2) be resilient (e.g., redundant paths, cyber protections, adapting to climate changes), and (3) improve access for private Internet and Cellular Service Providers (Service Providers) to reach unserved and underserved areas. The availability of fiber is required infrastructure for the high-speed, reliable wired and wireless Internet access that is critical to residents, businesses, community institutions, and the public sector. Fiber is the infrastructure needed for online services and technologies including online education, telehealth, teleconferencing, teleworking, cloud computing, 4G and 5G cellular, reliable and high performing public Wi-Fi, intelligent traffic management, smart water controllers, remote cameras, smart infrastructure monitoring, and utility of the future applications.

The City's investment in a Citywide Fiber Network also helps address historical inequity in digital infrastructure highlighted in the Framework for Racial Reconciliation Report, and may attract greater private sector investments, including fiber, for all residents and businesses, thereby advancing the City's digital inclusion and economic development goals identified in both the Blueprint for Economic Development and the Everyone In Implementation Plan approved by the City Council.

As part of the Citywide Fiber Network Infrastructure Initiative, the City has engaged TBG who has been assisting with planning and design and also helped the City conduct a Request for Information (RFI) process to identify and assess opportunities for future Public-Private

Partnerships with potential Service Providers. Based on the results of the RFI assessment, it was determined that there are two main opportunities to better partner with Service Providers.

First, the Citywide Fiber Network infrastructure will be built with excess capacity to enable Service Providers to leverage the City's investments to reach underserved areas through faster deployment and lower construction costs with less disruption to streets and neighborhoods. Second, in situations where fiber services from a Service Provider are already in place or available at a lower operating cost than the City's costs to build its own, or in situations where the City is leasing office space, the City will consider purchasing fiber service for these locations from the private sector, or continue leasing fiber services from previously-executed agreements with Frontier, Charter/Spectrum, and Verizon.

This approach allows the City to meet its own internal needs, while also addressing our digital equity and economic development goals and minimizing future disturbance to public streets. The City will return to the City Council in early 2021 to expand the agreement with TBG to assist in the next steps needed for the Engineering and Construction phases of the network infrastructure, including a more-detailed survey, testing, and analysis of the City's existing fiber infrastructure, and will return to the City Council in 2022 for construction awards resulting from these processes.

Progress Update

The following is a brief summary of the progress to date and anticipated next steps:

Telecom Expansions

In March 2018, City Council approved extending and expanding existing Telecom Agreements with Frontier, Charter/Spectrum, and Verizon to enable continued delivery and enhancement of data communications for critical citywide projects under way. Currently, over 50 percent of City locations are served by these private fiber connections (Attachment B has a list of locations). TID will be returning to the City Council in Spring 2021 to request a continuation of these Telecom Agreements until the Citywide Fiber Network is completed and ongoing service levels are determined.

Technology and Innovation Commission Update

In November 2018, TBG presented an update to the Technology and Innovation Commission (TIC) related to the Citywide Fiber Network Infrastructure Initiative. The update included plans to: (a) Issue a Request for Information (RFI) relative to the availability of private industry fiber on various streets throughout the City for connecting City facilities, as well as assessing private industry interest in leasing access to excess City fibers and/or City underground conduit space for their own fiber; and, (b) conduct implementation planning research to answer key design and engineering questions (e.g., confirm locations of existing fiber routes, locate conduit crossings on bridges, find access points for existing fiber and conduits, develop architecture rules, evaluate aerial or underground construction considerations, locate prints, and inspect ESRI/GIS and fiber management systems).

City Fiber Infrastructure Utilization RFI

In December 2018, the City released RFI No. TI19-064 to identify potential private sector Service Providers with a desire to expand fiber broadband infrastructure in Long Beach. Purchasing staff notified potential respondents, including Frontier, Charter/Spectrum, Southern California Edison, Crown Castle, Verizon, and others. TBG also expanded the outreach to potential respondents, notifying potential industry partners. TID and TBG also shared the RFI at the January 2019 Long Beach Digital Inclusion Roundtable. Key questions in the RFI were:

- Which City facilities are not yet connected to fiber and need service?
- Do local Service Providers (e.g., Frontier, Charter/Spectrum, Verizon, Edison, Crown Castle, etc.), already have fiber on the routes to those City buildings without fiber?
- If the City built fiber in underground conduit with extra space, would local Service Providers be interested in leasing fiber or conduit space from the City?

Six responses were received from Charter/Spectrum, Southern California Edison, Crown Castle, Verizon, MM Internet, and Inyo Networks. The Service Providers with legacy infrastructure reviewed their existing and planned routes within the city, noting which areas had existing fiber and which did not, and shared their interest in being a tenant on City-owned infrastructure to expand their fiber networks onto streets currently without fiber. A summary of the Fiber RFI Response is included in the table below:

Fiber RFI Response Summary						
	Charter/ Spectrum	**Crown Castle**	**Inyo Networks**	**MM Internet**	**Southern California Edison**	**Verizon**
Owner of Fiber & Conduit in LB?	Yes	Yes	No	No	Yes	Yes
Current Route Miles of Fiber in LB	Confidential	60	0	0	123	Confidential
Interested in Being a City Network Tenant?	Yes	Yes	Yes	Yes	No	Yes

Key takeaways included:

- All potential Service Providers would have to construct new fiber routes to serve some of the City's locations. While a few City locations that are not already connected to City fiber do have fiber available from one of more Service Providers, the majority of the planned routes do not yet have conduit or fiber infrastructure from any Service Provider on those streets. Furthermore, there were no existing commitments to investments in fiber on these routes by the responding Service Providers.

- There is substantial interest from Service Providers in being tenants to City conduit and/or fiber on routes without fiber today. Primary reasons included faster deployment and lower construction costs with less disruption to streets and neighborhoods.

In short, expanding the City's conduit and fiber network would (a) bring fiber to locations and neighborhoods in Long Beach that do not currently have any fiber infrastructure, (b) reduce the cost and other barriers for Service Providers to expand their networks into these areas for residential, commercial, and/or wireless services, and (c) protect street infrastructure from future disruption.

Based on the results of the RFI and Citywide Fiber Network Implementation Planning, the City intends to proceed as planned with construction of its own Citywide Fiber Network in underground conduit with excess capacity to accommodate other Service Providers. Having additional capacity would incentivize private sector investment in fiber and broadband helping the City to meet its own internal needs, while also addressing its Digital Inclusion and Economic Development Department (ED) goals and minimize future disturbance to public streets. In addition, the City will evaluate construction to some locations on a case-by-case basis and, when appropriate, may consider purchasing fiber to these locations from the private sector, or continue leasing fiber connections that were contracted in the previously-executed Telecom Expansions with Frontier, Charter/Spectrum, and Verizon.

Citywide Fiber Network Implementation Planning

Between mid-2018 to mid-2019, TBG assisted with evaluating implementation approaches for fiber network construction, including confirming fiber conduit and fiber routes, evaluating aerial and underground considerations, coordinating plans with City departments and utilities, supporting Dig Once planning efforts, and inspecting ESRI/GIS and Vetro fiber management systems. In December 2018, TBG supported Public Works (PW) and TID in executing a Master License Agreement with Verizon Communications to implement small cell technology in the public Right-of-Way (ROW), which included partnership terms to provide the City nearly 9 miles in conduits, support digital inclusion programming, and support several PW data analytics initiatives (Attachment C includes a sample of key implementation considerations that have been researched and evaluated).

Civic Center Fiber Loop Construction

Throughout 2019, TID called on TBG to assist with completion of the Civic Center Fiber Loop construction and migration, including assistance with vendor management, permitting, and oversight of portions of construction. The Civic Center Fiber Loop provides extensive fiber capacity, scalabilitity, and redundancy across the City Hall, Main Library, and Port Headquarters buildings, allowing the campus to serve as the current and future central communications hub for Citywide technology, including Public Library Internet Services, Citywide Internet Services, Traffic Management Systems, City and Port Interoperability, and Public Safety Communication Systems. In addition, the Civic Center Fiber Loop provides local service providers (e.g., Frontier, Charter/Spectrum, Verizon) the ability to connect highly-scalable telecommunication services to the City.

Private Fiber and Small Cell Investments

In 2020, private Service Providers (especially Verizon, Crown Castle, and AT&T) have significantly increased private investment in Fiber to Small Cells throughout Long Beach, which we anticipate will continue in 2021. Their focus is on 5G rollout, filling cellular coverage gaps, and expanding cellular bandwidth in high density areas. We have a unique opportunity to partner with the Service Providers to help achieve our individual and mutual goals at an overall lower cost to both parties. This coordination will also multiply public benefits and help us achieve our smart city and digital divide goals faster.

Next Steps

Having completed the Telecom Expansions, Fiber RFI, Fiber Network Implementation Planning, and Civic Center Fiber Loop projects; coordinated with private Service Providers on fiber and small cell investments; and, noting the deficiencies of private Service Providers network facilities in some neighborhoods, staff recommend the following next steps:

1. Detailed City Fiber Survey including testing, validation, and analysis.
2. Detailed engineering and drawings of the Conduit and Fiber Network.
3. Preparation of a construction bid package for the Conduit and Fiber Network.

Regarding the Fiber Survey, the City's existing fiber assets have been constructed over the course of decades and are managed by various departments. To determine precise location and availability, PW and TID commenced initial field inspections of the existing network and City facilities with TBG's guidance. Based on these initial inspections, a complete Fiber Survey will need to be completed to locate, test, and inspect the existing City fiber assets prior to detailed engineering and construction. Cataloguing the availability of existing assets up-front will be valuable for reducing maintenance costs, construction costs in bids received, network disruptions, and damage to assets. Staff will return to the City Council in Spring 2021 to expand TBG's contract to conduct this detailed inventory and to assist with the remaining steps.

Following completion of the Fiber Survey, TBG, PW and TID will develop detailed engineering and drawings and later prepare a bid package for construction. Staff may return to the City Council to request additional engineering consultation as needed. Meanwhile, ED, PW, TID, and TBG are working closely to align on immediate Dig Once opportunities, incorporate Digital Inclusion Roadmap recommendations, coordinate planned road work with construction of the fiber network, and work to provide City Council with recommended updates to the Dig Once policies.

Conclusion

Lessons learned from the COVID-19 emergency and the Framework for Racial Reconciliation have only strengthened arguments for the Citywide Fiber Network Infrastructure Initiative to connect residents, business owners, and City services to those most in need.

Thank you for your continued support for this effort and for the work ahead. For questions about this upate or other activities related to the Fiber Network Infrastructure Initiative, please contact Cason Lee, Deputy Director of Technology and Innovation, at (562) 570-5553.

ATTACHMENTS

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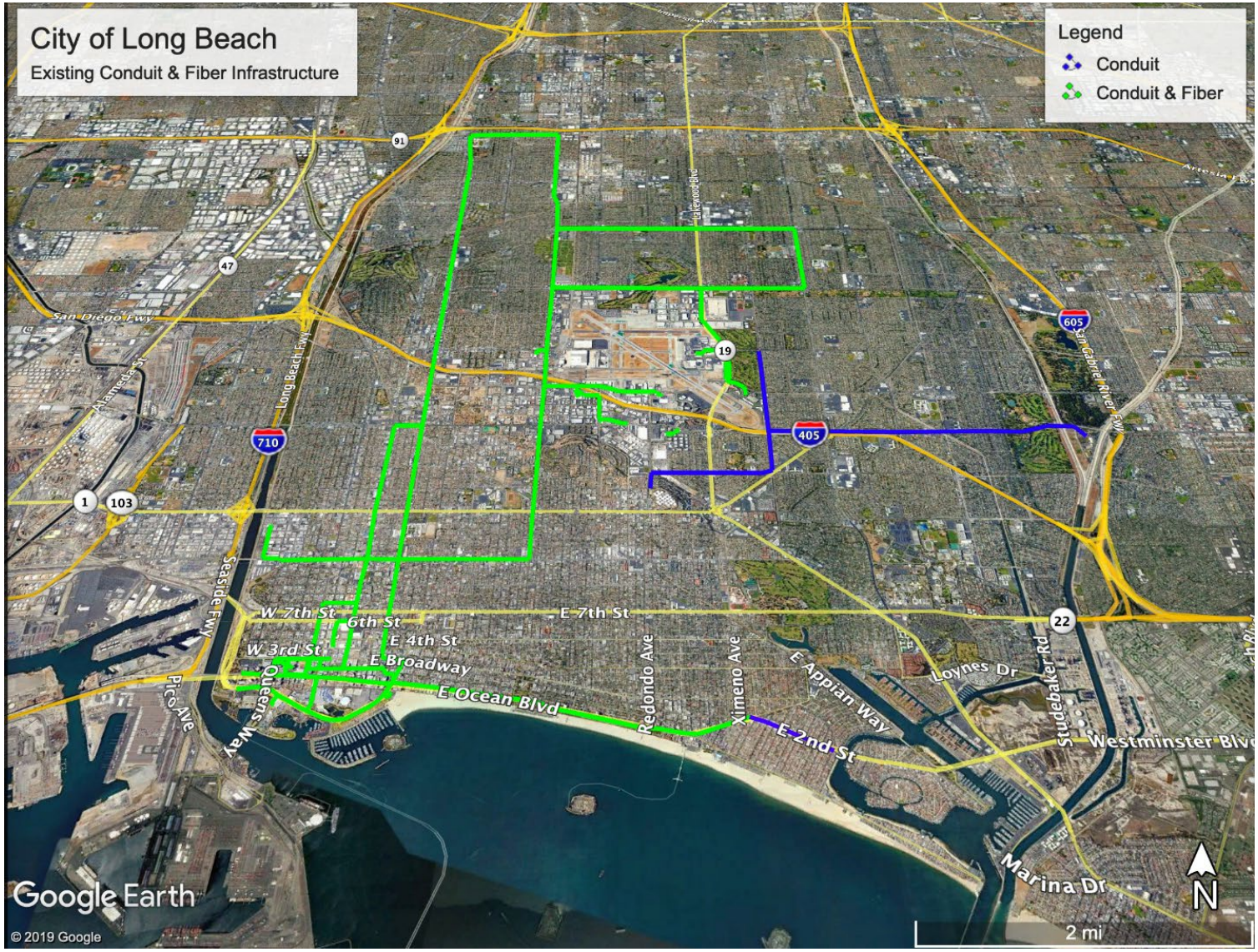
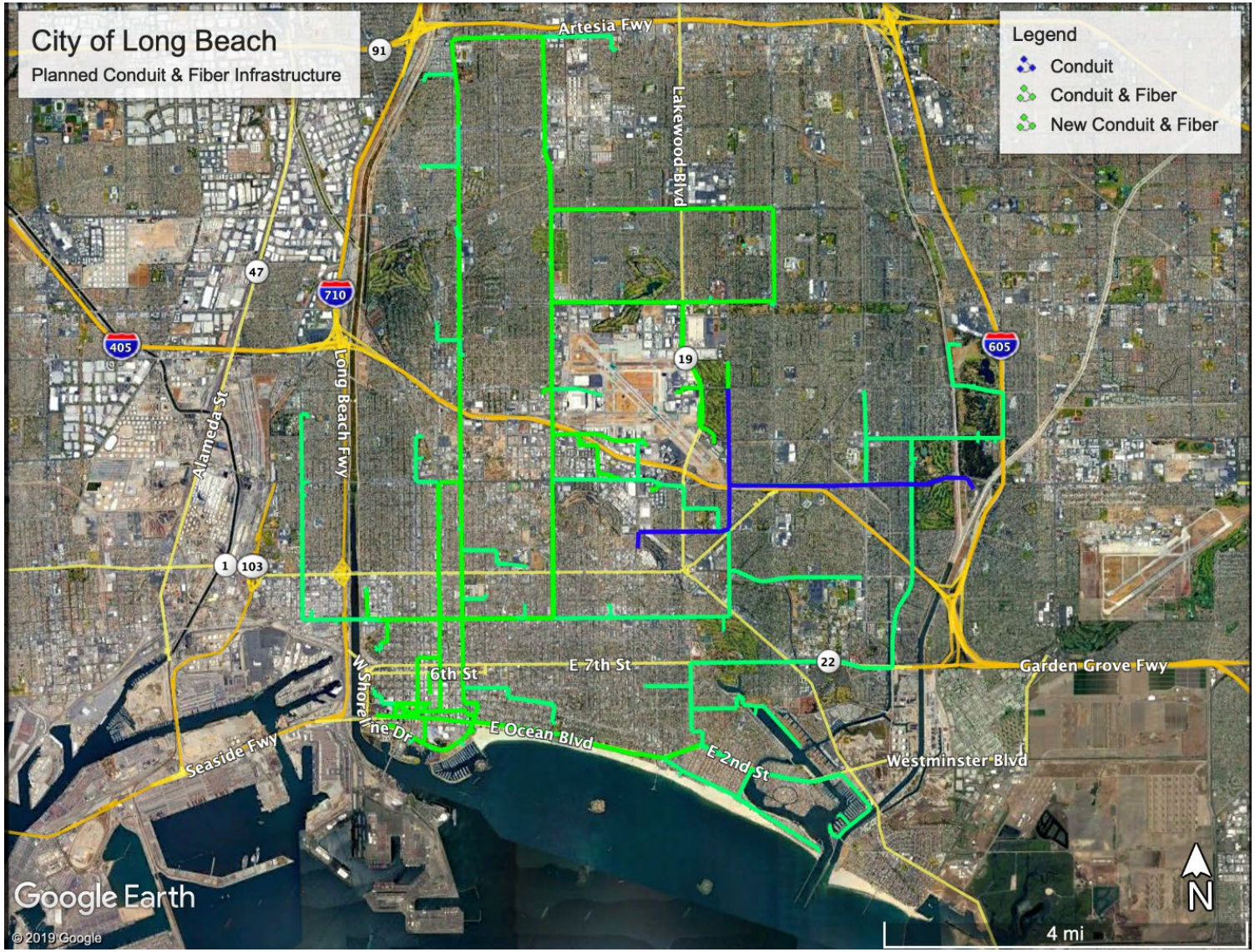
Attachment A – Current and Planned Conduit & Fiber Infrastructure

1. Current Infrastructure



Updated February 2020 following Preliminary Field Inspections

2. Planned Infrastructure



Based on High-Level Preliminary Engineering

Attachment B
Inventory of Fiber Connectivity to City Locations

1. Locations Already Connected to City of Long Beach or Port of Long Beach Fiber[1]

1	Aquarium Parking Structure
2	Billie Jean King Main Library
3	Broadway Parking
4	Burnett Library
5	Career Transition Center Youth Opportunity Center
6	City Hall
7	City Place Parking Structure
8	ECOC
9	Environmental Services
10	Fire Headquarters Heliport / Field Support
11	Fire Station 1
12	Fire Station 15
13	Fire Station 20
14	Fire Station 24
15	Fire Station 6
16	Fleet Services
17	Golden Shore Maintenance Yard
18	Houghton Park / North Facilities Center
19	LBGO Gas & Oil / Traffic Operations
20	Long Beach Airport
21	Mark Twain Library
22	Michelle Obama Library
23	Police Headquarters
24	Port Security / JCCC
25	Public Service Yard
26	Ruth Bach Library
27	SERRF
28	Towing Operations/Lien Sales
29	Video Communications
30	Water Administration
31	Water Treatment Plant

[1] The City and Port fiber networks cross-connect in the City Hall data center.

2. City Locations Connected by Fiber Service Providers (Telecoms Stopgap Agreements)

1	72nd Place Lifeguard Station	33	Fire Station 4
2	Airport Maintenance Yard	34	Fire Station 5
3	Airport Operations	35	Fire Station 7
4	Alamitos Bay Marina	36	Fire Station 8
5	Alamitos Library	37	Fire Station 9
6	Animal Care Services	38	Forensic Science Services Lab
7	Bay Shore Library	39	Housing Authority
8	Beach Maintenance Yard / Belmont Pool	40	LBCC - PCH
9	Beach/Lifeguard Operations	41	LBCC – LAC
10	Boat Operations / Marine Maintenance Yard	42	Los Altos Library
11	Bret Harte Library	43	Main Health
12	Brewitt Library	44	McBride Park / California Recreation Community Center
13	Central Health Facility / CD 6		
14	Cesar Chavez Park	45	Miller Family Health Education Center
15	Dana Library	46	Multi-Service Center for the Homeless
16	Downtown Marina	47	North Division Substation
17	Drake Park	48	Parks & Recreation Administration
18	East Division Substation	49	Police Academy
19	El Dorado Library	50	Public Works Chester
20	Fire Station 10 / Fire Warehouse / Museum	51	Rainbow Harbor/Pier Point
21	Fire Station 11	52	Ranger Station
22	Fire Station 12	53	Recreation Clubhouse/Aquatics & Sports
23	Fire Station 13	54	Senior Center
24	Fire Station 14 / CD3	55	Silverado Park / Pool
25	Fire Station 16	56	Special Events & Filming
26	Fire Station 17 / Fire Training	57	Veterans Park
27	Fire Station 18	58	West Division Substation
28	Fire Station 19	59	West Facilities Center & Admiral Kidd Park & CD7
29	Fire Station 2	60	WIC North Office
30	Fire Station 21	61	WIC St. Mary Medical Center
31	Fire Station 22	62	Wireless
32	Fire Station 3	63	Workforce Development

3. City Locations with No Fiber Connectivity (partial listing)

1	Bixby Knoll Park Community Center
2	Bixby Park
3	Cherry Park
4	College Estates Park
5	Coolidge Park Community Center
6	De Forest Park Community Center
7	District 8 Field Office
8	District 9 Field Office
9	Freeman Center
10	Graffiti Office
11	Homeland Cultural Center at MacArthur Park
12	Leeway Lifeguard Stations
13	Leeway Sailing & Aquatics Center
14	Marine Stadium Maintenance Yard
15	Orizaba Park Community Center
16	Pan American Park
17	Property & Evidence Warehouse
18	Rainbow Harbor Kiosk
19	Ramona Park
20	Recreation Park Community Center
21	Stearns Park
22	Wardlow Park
23	Whaley Park
24	WIC Memorial Hospital

Attachment C
Key Implementation Considerations

Underground or Aerial Construction

A key question in network construction is whether to use aerial utility poles or underground conduit. Aerial construction (attaching to electric utility poles) typically provides significant savings compared to new underground construction. However, obtaining Pole Attachment Rights has historically been a challenge for municipalities. Consequently, the location of existing aerial poles with the City was inventoried, and the possibility of using aerial routes for City Fiber was evaluated.

To date, 100% of the City's fiber assets have been constructed underground. While typically costlier, underground construction brings additional benefits, including aesthetic advantages and the ability for local Service Providers to use excess capacity in City-owned conduit routes, minimizing the need for future lane closures and construction in the public Right-of-Way (RoW), while reducing barriers to extending fiber into new areas of Long Beach.

Regulatory research revealed that there is no clear legal structure for the City to obtain Pole Attachment Rights for a City-owned fiber network. The California Public Utilities Commission (CPUC) requires investor-owned utilities and Incumbent Local Exchange Carriers (ILEC) to provide access to their utility poles to Competitive Local Exchange Carriers (CLEC), Cable TV Providers, and wireless Telecommunications Providers; however, these rights do not extend to municipalities.

One option considered was for the City to join the Southern California Joint Pole Committee (SCJPC), which consists of utilities, Communications Providers, and municipalities in Southern California who hold joint equity interest in utility poles. However, it appears that all municipalities currently on the SCJPC are those that operate Municipal Electric Utilities, which the City of Long Beach does not. Furthermore, clear statutory authority to reserve space via a Franchise Grant does not exist and, more general public interest authority has not been successfully exercised in this manner. Finally, recent attempts by municipalities in other states to regulate pole attachments through rights-of-way management authority have been unsuccessful.

Based on these unresolved and cumbersome limitations associated with aerial construction as well as the advantages of underground construction previously mentioned, the decision was made to proceed with 100% underground construction. It is important to note, however, that the City can still use City-owned poles, when available, to connect its facilities to the underground backbone network.

L.A. River Crossings

As Attachment A shows, the City's existing fiber network does not cross the Los Angeles River into West Long Beach, and the results of the RFI demonstrated that most of West Long Beach does not have fiber connectivity. For redundancy, the original Scenario 1 plan utilized two (2) L.A. River Crossings for the proposed West Long Beach Ring:

- One (1) across the New Blue Line fiber (planned under an agreement with LA Metro), and
- One (1) across City conduit (believed to be on the Anaheim bridge)[1].

[1] A backup option was to utilize Port Authority conduit on the Queensway or Ocean bridge, but this would require obtaining permission to construct fiber underneath the railroad tracks that separate the Port from West Long Beach.

Field investigations conducted during implementation planning revealed that (a) the New Blue Fiber was only half-built and does not extend across the river, and (b) the City does not have conduit in the Anaheim bridge.

Several potential solutions are being assessed:

- The TI Department is coordinating with Frontier to determine if the old Red Cable Plant conduit on the Anaheim Bridge is still in place and usable by the City. The Red Cable Plant was a copper network constructed in the 1970s by GTE (a telecommunications company acquired by Frontier) to serve the Long Beach Fire Department. While the Red Cable Plant copper network is outdated, the conduit in which it travelled across the Anaheim Bridge may potentially be available for the City Fiber Network.
- The RFI revealed that multiple private companies own fiber river crossings, meaning that dark fiber could potentially be leased or traded for the West Long Beach Backbone Ring.
- Long Beach's Water & Gas Department may have viable crossings though, it is unclear whether fiber can be attached to these, or
- As previously mentioned, if Port Authority fiber could be used to cross the river and fiber could be constructed from the Port under the railroad tracks into West Long Beach.

<u>Other Implementation Research Completed:</u>

- Mapped City fiber and conduit constructed since 2017, including counts and sizes.
- RFI: Mapped existing and planned fiber routes from Charter, Edison, Crown Castle, and Verizon.
    - *Note: Frontier did not respond to the RFI.*
- Obtained a map of fiber assets from the Port Authority.
- Completed inventory of City-owned buildings and current level of connectivity for all City locations.
- Obtained timeline for New Blue Line fiber construction from Metro.
- Estimated current local directional boring and labor costs for construction (based on past bids).
- Evaluated potential network architectures and whether existing routes have sufficient fiber capacity for proposed City network.
- Evaluated ESRI/GIS and Fiber Management Systems for tracking fiber and conduit assets.