



Technical Memorandum

To: Ms. Patricia Strayer, P.E.

From: Kevin Schanen, P.E.

Date: May 24, 2017

Subject: Town of Palm Beach – Future Fiber Optic Communications System

In accordance with Task 1.1.2 of our scope of services related to Master Planning of the Town-wide Undergrounding Program, Kimley-Horn developed recommendations for the construction of a fiber optic communication system for use by the Town. The purpose of this system is to enhance the safety, security, and operational capabilities of the Town while taking advantage of the enhanced efficiency and cost savings that is realized by installing the backbone infrastructure for such a system during the Town-wide Undergrounding program.

The Project Background, Analysis, Opinions of Cost, and Recommendations follow below.

Project Background

The Town of Palm Beach is a municipal agency that provides the community with a number of services including, but not limited to:

- Public Safety (Police and Fire Departments, Beach Life Guards)
- Public Sanitation (Sanitary Sewer collection and transmission, Trash Collection)
- Recreational Facilities
- Roadway Maintenance (Paving and Signals)
- Flood Protection (Stormwater collection and transmission)

All of the above services require varying levels of technological support. It is known that the Police Department maintains a network of security devices throughout the island to enhance crime prevention capabilities and that the Public Works Department uses a radio telemetry system to monitor their network of over 60 storm and sanitary pump stations. The current technology that is employed has served the Town well over the years but as technology advances, there are operational efficiencies and enhancements that cannot be realized without a system upgrade.

There are a number of advantages that a fiber optic communications system can provide including enhanced security, enhanced operational flexibility, increased speed for data transfer, and increased flexibility to accommodate and make use of advancing technology. The Town's planned Undergrounding program offers a unique opportunity to install conduit infrastructure at a reduced cost

that could be used to support a new communications network that would allow the Town to capitalize on advancing technology. Additionally, the Town engaged Magellan Advisors to explore the feasibility of developing new Broadband Infrastructure throughout the island.

The objective of this memorandum is to recommend an option for the routing of the backbone conduit infrastructure and provide an order of magnitude opinion of cost for such conduit. The design of a Town-serving or public communications network (fiber optics cable, equipment, connections, etc.) along with the associated costs are not contemplated at this time and will be developed once the Town has budgeted for such improvements.

A secondary objective is to provide a conceptual opinion of probable construction cost to construct additional fiber optic conduit(s) radiating out from the backbone that have the ability to reach all properties in Town so that a Fiber to the Premises (FTTP) Infrastructure Network could be deployed in the future with minimal disruption to the right of way.

Analysis

To begin our analysis, we first met with the Town of Palm Beach Public Works and Public Safety Departments on July 6, 2016 to gain a better understanding of the existing systems in place and learn if there were any desired system improvements, whether budgeted or not. The following individuals attended the meeting:

- Patricia Strayer (TOPB)
- Brett Madison (TOPB)
- Jim Palmer (TOPB)
- Dan Szarzewski (TOPB)
- Christine Cunningham (TOPB)
- Kevin Schanen (KHA)
- Anjuli Panse (KHA)

In general, the Town operates various security related infrastructure throughout the island. Locations and types of security infrastructure was not discussed to protect the confidential nature of these improvements. The Police Department described several locations where they desire to have new security infrastructure installed.

Public Works expressed a desire to provide connectivity to the facilities that they operate. These include sanitary and stormwater pump stations, traffic signals, and Town owned buildings. A dedicated fiber optic connection between these facilities provides a greater degree of monitoring and control from a remote location which can enhance the level of service as well as reduce maintenance trips to the stations if the problem can be solved remotely. A dedicated fiber optic connection also reduces the reliance on third-party broadband providers to provide connectivity between the Town maintenance personnel and the facility which can improve reliability.

In determining the most cost effective backbone conduit route we reviewed the locations of Town operated facilities, major roadway corridors, locations that provide effective opportunities to expand service into the community in the future, and areas that would be feasible to install Fiber Optic Distribution Equipment. For the purposes of this analysis, it was assumed that Fiber Optic Distribution Equipment could be collocated within existing Town facilities such as pump stations and/or Town buildings/properties. A map of our recommended fiber optic conduit backbone route is attached to this memorandum that describes the proximity of the route to Town facilities. This map was developed collaboratively with Magellan Advisors during their Broadband Infrastructure Assessment of the Town. Magellan further recommended the installation of a redundant backbone through some areas in Town to improve overall reliability of the system.

The FTTP option for conduit installation expands on the backbone conduit routing described above. We have estimated that the conduit would need to be installed under all roadways within the Town in order to meet the objective of providing fiber service accessibility to all properties within the Town. Only mainline line conduit within the right of way is contemplated for installation in the FTTP option. Additional conduit between the mainline in the right of way and service point at the building/facility to be served (i.e. drop conduit), is not included in the opinion of cost for this option. The drop conduit is assumed to be installed at a later date if requested by the property owner.

In both the backbone and the FTTP options, we are assuming that 2-2" conduits will be sufficient for future fiber needs. We are not including the costs related to fiber optic cabling and related fiber optic distribution equipment at this time.

Conceptual Opinion of Probable Costs

Based on our analysis and subsequent direction from the Town, Kimley-Horn has developed conceptual opinions of probable construction costs for two options pertaining to future fiber optic communications systems within the Town. The assumptions made as well as a conceptual opinion of probable construction cost are provided below.

Option 1 – Backbone Conduit Only

This option includes backbone conduit only as illustrated in the attached map. This includes a redundant route as recommended by Magellan Advisors and additional conduit to specific areas as identified by the Town. This backbone route provides connectivity from one end of Town to the other, provides convenient connectivity to critical Town facilities/infrastructure and would have the ability for future expansion of the conduit network. However, expansion of the conduit network will require disturbances to the public right of way for the installation of additional conduit that radiates out from the backbone. This opinion does not include fiber optic cable or equipment.

Assumptions made for Option 1 include the following:

- Conduit design and installation occurs in conjunction with each phase of the undergrounding project

- Conduit is installed by directional bore as an additional conduit on a bore that was already planned for the undergrounding project
- Handholes are installed at every roadway intersection or every 300 feet.

This opinion includes a 10% contingency on conduit length to account for sweeps to pullboxes and access point locations, additional Maintenance of Traffic and Mobilization costs that would be required for this conduit installation, a 20% overall contingency, and a 3% CPI increase over the life of the project which begins with Phase 2 in 2018 and ends with phase 8 in 2024. Based on these assumptions, the conceptual opinion of probable construction cost for the Option 1 – Backbone Conduits installation is \$3,800,000.

The opinion of cost per Phase for Option 1 is as follows:

Phase 1	\$	870,000
Phase 2	\$	680,000
Phase 3	\$	500,000
Phase 4	\$	330,000
Phase 5	\$	380,000
Phase 6	\$	420,000
Phase 7	\$	320,000
Phase 8	\$	270,000

Option 2 – Fiber to the Premises Conduit

This option includes the installation of conduit only to all parcels on the island. Conduit lengths were estimated using the total length of public roadway for each phase of the undergrounding project. This opinion does not include fiber optic cable or equipment, nor does it include the drop conduit between the right of way and the service point of the building/facility to be served.

Assumptions made for Option 2 include the following:

- Conduit design and installation occurs in conjunction with each phase of the undergrounding project
- Conduit is installed by directional bore as an additional conduit on a bore that was already planned for the undergrounding project
- Handholes are installed at every roadway intersection or every 300 feet.

This opinion includes a 10% contingency on conduit length to account for sweeps to pullboxes and access point locations, additional Maintenance of Traffic and Mobilization costs that would be required for this conduit installation, a 20% overall contingency, and a 3% CPI increase over the life of the project which begins with Phase 2 in 2018 and ends with phase 8 in 2024. Based on these assumptions, the

conceptual opinion of probable construction cost for the Option 2 – Fiber to the Premises Conduit is \$11,100,000.

The cost per Phase breakdown for Option 2 is as follows:

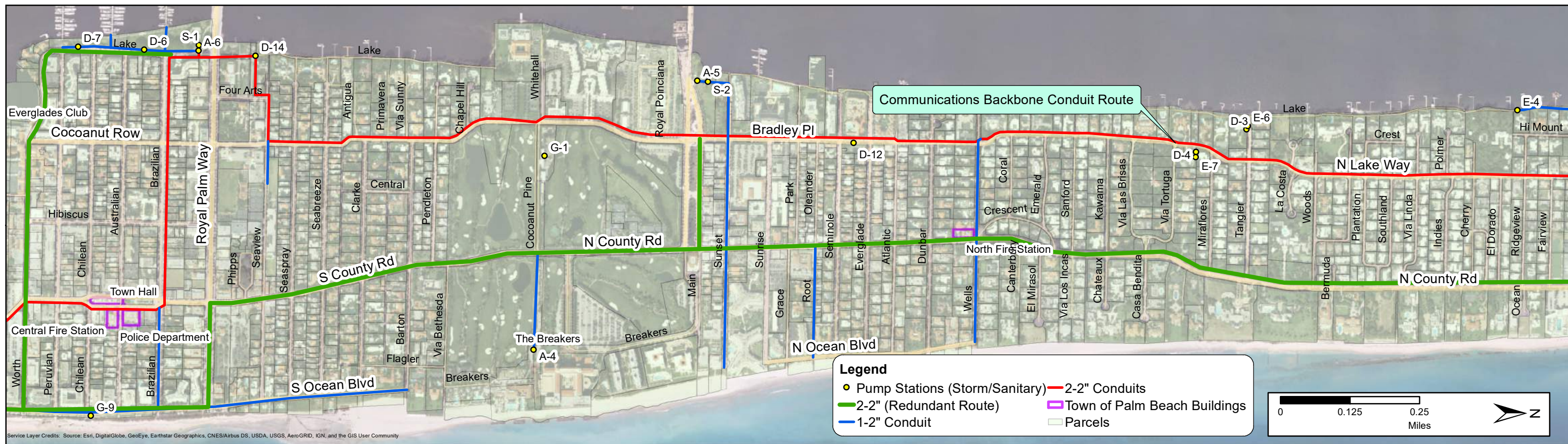
Phase 1	\$ 1,650,000
Phase 2	\$ 1,660,000
Phase 3	\$ 1,640,000
Phase 4	\$ 970,000
Phase 5	\$ 1,220,000
Phase 6	\$ 1,690,000
Phase 7	\$ 1,340,000
Phase 8	\$ 910,000

In developing the above opinions of probable construction costs for Options 1 and 2, it is noted that Kimley-Horn has no control over the cost of labor, materials, equipment, or over the Contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to Kimley-Horn at this time and represent only Kimley-Horn's judgment as a design professional familiar with the construction industry. Kimley-Horn cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

Should you have any questions please do not hesitate to contact me directly at 561-840-0820.

Attachments: Fiber Optic Backbone Routing Map

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CONCEPTUAL FUTURE COMMUNICATIONS SYSTEM MAP
TOWN-WIDE UNDERGROUNDING OF UTILITIES



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CONCEPTUAL FUTURE COMMUNICATIONS SYSTEM MAP

TOWN-WIDE UNDERGROUNDING OF UTILITIES



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CONCEPTUAL FUTURE COMMUNICATIONS SYSTEM MAP

TOWN-WIDE UNDERGROUNDING OF UTILITIES

TOWN OF PALM BEACH, FLORIDA

MAY 2017

MASTER PLAN

