BYERS ENGINEERING COMPANY

Proposal

To

Indian River County, Florida

Implementation of NexusWorx

Phase 3

Byers Engineering Company
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Revision History:

Date	Issue	Author	Notes
11/25/2019	1.0	Mark McDougald	
12/12/2019	2.0	Mark McDougald	Revised to note that Aerial Splices and Pole mounted splice cabinets will be inventoried by Gerelcom and not part of Byers scope.

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1. OVERVIEW

This proposal is Byers response to Indian River County's (IRC) requests for a survey and inventory of your fiber optic facilities and encoding of a final phase, Phase 3, of the IRC network into Byers NexusWorx fiber management system. In 2017 Byers has conducted a field survey and inventory, including splice verification, for a pilot area. This pilot project has refined the data points needing to be captured and populated in NexusWorx and as such is reflected in this proposal. In the Phase 2 proposal the network was divided into two phases, 2 and 3. The Phase 2 implementation is complete with the exception of updating connectivity. This proposal contains the cost and effort for the phase 3 area to complete the ISP and OSP surveys, encoding updates and connectivity updates as captured by Byers and OSP splice verification vendor.

As in Phase 2 Byers will not be responsible for the splice verification effort, but IRC will utilize their vendor of choice for this verification. Byers will identify the splice locations as part of our survey and inventory and provide detail list to IRC of these splice locations with fiber cable sizes. We will update the connectivity based on the splice verification data provided from the splice verification vendor and connectivity data from the ISP inventory.

Byers pricing is based on the task and scope as defined within this document and estimated units as outlined below.

Unit	Number
Aerial Route Miles	18
Underground Route Miles	59
ISP Locations	36
Signal Cabinets	42

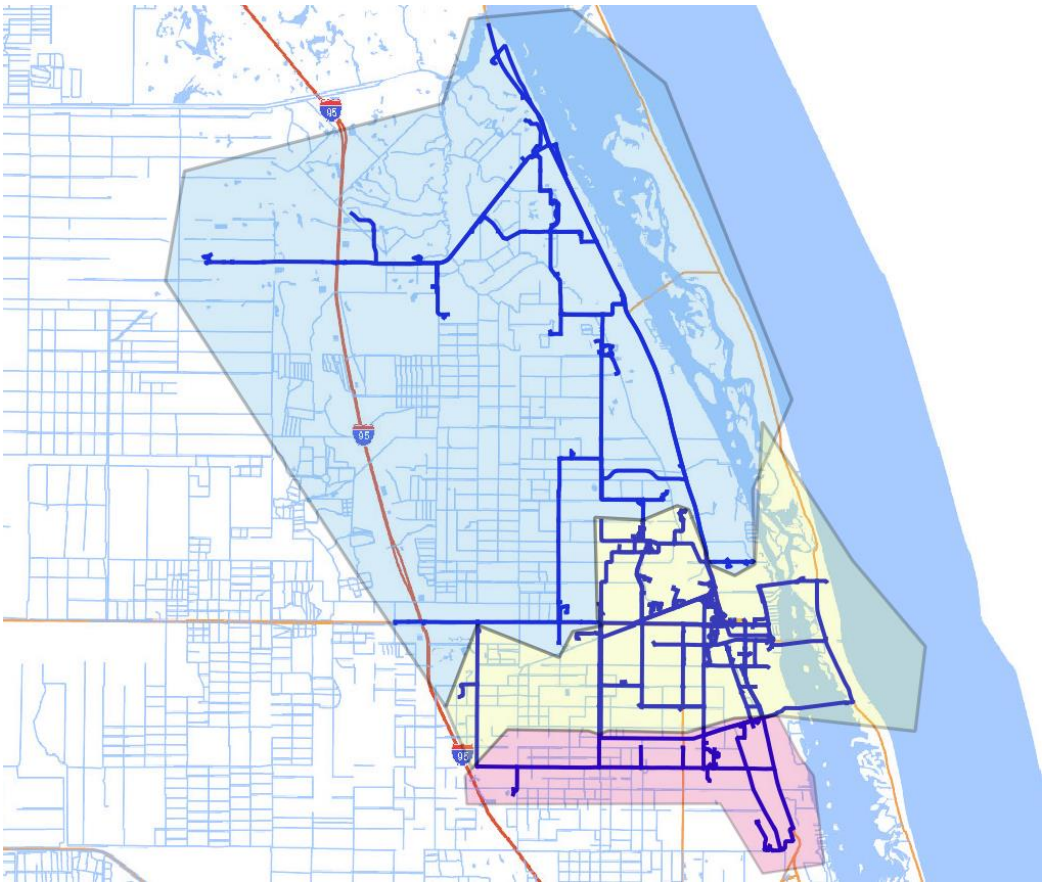
Byers' lump sum price for each phase including all travel and expenses is as follows.

- Phase 3 - **$104,750**

Byers expects to utilize two survey crews with a lead performing ISP Inventories, they should be local in Indiana River for 4-5 weeks performing these survey's.

2. PROJECT SCOPE

The final implementation for the entire IRC network has been subdivided into two project areas which are identified on the map images below. The areas are; Red highlighted areas Pilot, Yellow Phase 2 and Blue is Phase 3



Phase 3 is the northen most blue polygon.

3. PROCESS AND TASK

Step 1 – GIS Data Update

In this initial step Byers will utilize an export of the county's GIS database, same format and structure provide in the pilot, and will perform a cross check between these features and what was previously provided. Any new features or coordinate changes in the new phases will be loaded into NexusWorx based on the same import rules from the Pilot project. ***We will not update what has already been updated for Phase 2 or Pilot area.***

Step 2 – OSP/ISP Field Inventory

The following covers the task and data that will be collected from the field inventory of ISP and OSP plant. All work will be performed by Byers employees, who primarily are based in our Atlanta office. At the end of the phase, Byers will provide a splice location report, this data can be provided to IRC's splice verification vendor for this task.

- Electronic locate of underground facilities in the following scenarios
  - Conduit runs where Conduit Access Points documented in the GIS but not discovered in the field.
  - Conduit runs where Conduit Access Points are greater than 600' apart. This is to discover additional Conduit Access Points that might be buried.

  - For all direct buried segments.
- At Underground Handholes
  - Type and Size
  - Lid Rating
  - Locate Ball present.
  - Number, Type, and Size of Ducts and/or Innerducts
  - Fiber Optic Cable; Manufacture, Size, Sequentials (at Duct, at Splice Case or Center)
  - Verify splice closure presence.
  - Site Pictures.
- Aerial Locations
  - Denote and verify Splice Locations and/or Slack Loops from the ground only. Details will be obtained by the splice verification vendor.
  - Site Pictures.
- Traffic/Splice Cabinets
  - Fiber Terminating Devices, Type, Manufacture, Model, Serial #, Number of Ports
  - Fiber Optic Cable; Manufacture, Size, Sequentials (at Duct, at Splice Case or Center)
  - Cross-connect (jumpers) Details – Where possible, we do not disconnect or demount equipment.
  - Site and cabinet content pictures.
- Equipment Locations (Buildings)
  - Fiber Terminating Devices, Type, Manufacture, Model, Serial #, Number of Ports, Port Connector Types.
  - Terminating Conduit – Number, Type and Size of Ducts and/or Innerduct.
  - Fiber Optic Cable; Manufacture, Size, Sequentials (at Duct, at Splice Case or Center)
  - Cross-connect (jumpers) Details - Where possible, we do not disconnect or demount equipment.
  - Rack Details – Type, Size and rack positions for equipment.
  - Site & equipment pictures
- Poles
  - Only visual verification will be performed on Poles, meaning a check to see of pole exists and cable is attached.
  - All pole mounted splice cabinets will be surveyed by the splice verification vendor and not Byers. The vendor will provide Byers with the splice data the cable sheath particulars.

Step 3 – NexusWorx Infrastructure Update.

The updating of data in NexusWorx will include the following items:

  - Breaking Fibers Optic Cables at inventoried splice locations not found in the GIS data.
  - Breaking Conduit segments
  - Updating Conduit Duct Groups
    - Number of Ducts
    - Size
    - Type
  - Updating Fiber Device attributes including but not limited to:
    - Manufacture
    - Size
    - Strand Group
    - A_ID
    - A_Size_Sequential
    - Z_ID
    - Z_Size_Sequential
    - Length

        - Owned % values
    - Creating Equipment Location features (Fiber Termination Location) with following attributes.
        - Site Identification Name
    - Import Fiber Devices into Traffic Cabinets and Equipment Locations (Buildings) with following attributes.
        - Comments (Common Name)
        - Manufacture
        - Model (If available)
        - Fiber Mode
        - IP Address (If available)
        - Trunk Ports
    - Attachment of digital pictures for:
        - Conduit Access Points
        - Cabinets
        - Equipment Locations
    - Creating Building Footprints
    - Creating Racks and mounting fiber devices and attaching pictures.

Step 4 –Build Splice Connectivity in NexusWorx.

Upon completion of splice verification by IRC's vendor and providing data that aligns with Byers needs a NexusWorx data technician will utilize the field verified splice data and our ISP connectivity data to build fiber strand and/or port connectivity in NexusWorx.

Byers will need to work with IRC to define a Fiber Path naming convention that will be utilized.

4. ASSUMPTIONS

The following are the assumptions regarding each phase.

Step 1 – GIS Data Update –

- This will be a cross compare to the initial migrated GIS database, and we'll upload into NexusWorx any new features in GIS, not in the initial data load or removed from the county's GIS as long as the removal appears logical. This is only for the Phase 3 area.
- We expect the delta between these data sets is expected to be less than 5%.
- Below are the rules utilized in the initial migration and the same applies for the update:
    - Fibers will be loaded only from County Fiber Optic Cable feature class since this contains all of the consortium fibers.
    - Fiber Optic Cable feature class contains Copper cables and Conduits which will be extracted and loaded into Copper Cable and Conduit Duct Bank features.
    - The County Handhole feature class contains, in addition to Handholes, Patch Panel, Traffic Cabinets, and Splice Closure locations. Only Handholes, Traffic Cabinets, and Splice Locations will be loaded with these features.
    - Fiber Termination or Building locations will be generated from Fiber Building feature class.
    - Byers will add new attributes to capture percentage ownership.
    - All data appears to geographically accurate so that no updates will be performed on these features. Fiber cables may be offset to the structures or conduit running line.

Step 2 – OSP/ISP Field Inventory & NexusWorx Update

- No Manholes exist or any underground structure is requiring mechanical pumping or ventilation.

- All Handholes should be visible or can be discovered by; electronic locating method or GPS location. Byers will not be rodding or pressurize conduit to discover Handhole locations.
- Any Handholes/Pull Boxes that cannot be discovered, then determined with IRC's interaction to be covered by hard surface or at unreasonable depths will be the responsibility of IRC to expose for Byers access. Byers will then inventory these locations as long as access can be performed safely within OSHA requirements without additional safety equipment and while survey crews are in local.
- Byers will collect GPS for any new features and update for those that appear to be inaccurate from the GIS.
- IRC will coordinate and/or provide access to building/ISP locations that will work within the timeframe while Byers personnel are on-site.
- IRC will provide any requirements, procedures and/or key's required for accessing traffic cabinets.
- No surveys will be conducted by Byers that require bucket trucks or latters. Any and all Aerial details will be captured by the splice verification vendor duing that phase.

Step 4 - Build Splice Connectivity in NexusWorx.

- Splice verification vendor will provide data in format provided by Byers.
- Byers timeline assumes that the splice verification vendor can perform their work within an expected timeline that allows Byers to complete our work. It's expected the will work almost parallel with the survey and inventory crews.

5. COST BREAKDOWN

Phase 3 –

- GIS Data Update - $3,500
- OSP Field Inventory and Survey – $93,250
- Data Encoding & Connectivity – $8,000

6. TIMELINE

Byers' expects that we can produce our deliverables within the following timelines.

- GIS Data Update – 30 Calendar Days from provided GIS export.
- ISP/OSP Survey and Encoding updates – 120 Calendar Days from start of field survey (Byers can commence this as early as first of February)
- Fiber Connectivity Updates – 30 Calendar days from the date of being provided all the OSP splice details for all splices.