

ATTACHMENT A1

Response Cover Sheet

Name of Respondent Matrix Design Group, Inc.			
Mailing Address 11 Melanie Lane, Unit 14	City/Town East Hanover	State New Jersey	Zip Code 07936
Telephone (973) 503-1400	Fax (973) 503-5666	Web Address www.matrixdg.com	
Primary Contact for Clarification Chris Lynch, Director New Business Development		Primary Contact E-mail Address clynch@matrixdg.com	
Authorized Signatory Robert Ritchie, President		Authorized Signatory E-mail Address britchie@millenniuminc.com	
Legal Status/Jurisdiction (e.g., a Massachusetts corporation) a New Jersey corporation		Respondents DUNS No. 79989302	

Certification

The undersigned, Robert Ritchie, President, hereby certifies
(Name and Title)

that I am a duly authorized representative of Matrix Design Group, Inc.
(Company Name)

and that all of the foregoing answers and all statements contained in any explanation are complete, true and correct. Providing false or misleading information or failure to provide all required information will be considered grounds for disqualification. I attest to the accuracy of all information contained in this application and verify that the information submitted is in fact complete, accurate and true.

Signed and sworn under the penalties of perjury

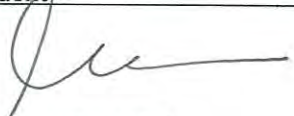
Dated at: East Hanover, New Jersey
(location)

This 29th day of July, 2015

By: 
(Signature)

Name: Robert Ritchie
(Printed or Typed)

Title/Position: President


CARLENE WILLIAMS
NOTARY PUBLIC OF NEW JERSEY
ID # 2201240
My Commission Expires 5/29/2017



From Concept To Completion

Request for Qualifications
No. 2015-MBI-03
RE: Town of Hardwick

Prepared For:

Massachusetts Technology
Collaborative
75 North Drive
Westborough, MA 01581
By Chris Lynch

07/31/2015

EXECUTIVE SUMMARY

Matrix Design Group is a full service fiber engineering and telecommunications design firm, who along with our sister company, Millennium Communications Group, can take almost any fiber project from concept to completion.

We have worked for large companies and organizations such Rutgers University, Level 3 and AT&T. We have also great experience with small New England communities such as the towns of EC Fiber in Vermont and the Towns of Leverett (FTTH build and final design) and Alford (FTTH design) in Western Massachusetts. We have been working with the Town of Hardwick Broadband Committee and Town Administrator to come up with the best case solution for getting high speed broadband to the unserved homes in Hardwick.

The Matrix Design Group plan will bring GPON FTTH to approximately 164 of the 258 unserved homes in Hardwick (the count of unserved homes is via mapping information provided by the Hardwick Broadband Committee). Coupled with Comcast's existing commitment to build-out to 94 unserved homes in the southwest corner of town (southern Greenwich Road) once the two builds are completed - the percentage of homes in Hardwick served by high speed broadband should approach over 97% (based upon 1,500 homes in town) – well above the goal set by the Massachusetts Broadband Institute of 96% coverage.

The Town of Hardwick presents many issues that need to be overcome in order to bring high speed broadband to the unserved residents of the Town. Among the hurdles to a fiber build in Hardwick include the following:

- Based upon the map information provided to Matrix Design Group the GPON FTTH build would need to cover 27.8 miles of road to reach 164 unserved homes. That's a density of just 5.9 unserved homes per mile which is not a density which would support any proper business plan without significant subsidy.
- The 27.8 miles of build include 5.2 miles of road where there are poles but either no homes or homes already served.
- The 27.8 miles of build also include 3.4 miles of road where there are neither poles nor homes to serve but are necessary in order to link the unserved parts of town.

In order to build our proposed GPON FTTH network in the Town of Hardwick, Matrix Design Group would require the following from the Massachusetts Broadband Institute (MBI):

- MBI would need to fund all make-ready and all aspects of make-ready in the town.
- MBI would need to fund new pole placement in town to connect the unserved areas.
- MBI would need provide Matrix Design Group with a grant to install fiber along the 5.2 miles of existing pole line where there are no unserved homes and along the 3.4 miles of new pole line where there are no homes.

- MBI would need to provide Matrix Design Group with a grant of \$500 for each of 164 unserved homes to help subsidize the network build

Four items worthy of mention regarding the Matrix Design Group plan for the Town of Hardwick:

- All 164 unserved homes would be served from the existing Massbroadband123 CAI at the Hardwick Fire Station on Hardwick Road (Route 32A).
- The investment in FTTH may be more expensive upfront but it would be superior in service and in every other aspect over any potential wireless or hybrid solution.
- Two of Hardwick's neighboring towns are among the 45 towns MBI has identified as being completely unserved (Petersham and New Braintree). The potential exists for these three towns to somehow work together in a regional network arrangement.
- Comcast has already committed to build out the Southwest corner of town and therefore should not be in need of any incentive funding

Matrix Design Group proposes to design and build out a GPON FTTH system passing 164 unserved homes in Hardwick. Once the network is built Matrix Design Group will maintain and operate the network for a period of twenty (20) years.

Matrix Design Group plans to offer the following services:

- High Speed Internet Service (up to 50 Mbps symmetrical) for \$95 / month
- High Speed Internet Service and a VoIP line for \$115 / month
- An additional VoIP line may be added for an \$20 / month
- An indoor ONT with built-in 802.11 AC WiFi will be optional for a charge of \$5 / month

The Town of Hardwick (or Hardwick MLP) will have the option to purchase the network for \$763,990 at any time during the first three years of operation. After three years the purchase price will decrease by \$44,940 per year. After the second year of operation \$3,500 will be added to the purchase price for each new subscriber added to the network. After five years of operation, the purchase price will no longer include either the subscriber ONT's or the head end OLT electronics. After 20-years the Town or the MLP will have the option to purchase the network for \$10.

The option to purchase the network will allow the Town of Hardwick to change service providers if they are unhappy with the level of service provided by Matrix Design Group. The option to purchase will also give the Town the ability to join a regional network if they so desire.

STATEMENT OF RESPONDENT'S QUALIFICATIONS

Matrix Design Group is a full service fiber engineering and telecommunications design firm, who along with our sister company, Millennium Communications Group, can take almost any fiber project from concept to completion.

The Massachusetts Broadband Institute is familiar with the work Matrix Design Group and our sister company Millennium Communications have done for the Town of Leverett where we built an Active Ethernet FTTH network to over 800 homes as well doing the final network fiber design. We would welcome a firsthand examination of the quality of work done for the town.

The Massachusetts Broadband Institute is also familiar with the work Matrix Design Group has done for the Town of Alford in providing a GPON FTTH fiber design for the town. A copy of the fiber design has been shared with the Massachusetts Broadband Institute.

Matrix Design Group and our sister company Millennium Communications has designed and built the GPON FTTH network for EC Fiber in Vermont. EC Fiber is a consortium of 24 towns in East-Central Vermont. Currently they have over 1,000 voice and data subscribers.

The above projects help illustrate Matrix Design Group's unique experience and expertise in building FTTH deployments in the tricky geography of small towns in New England.

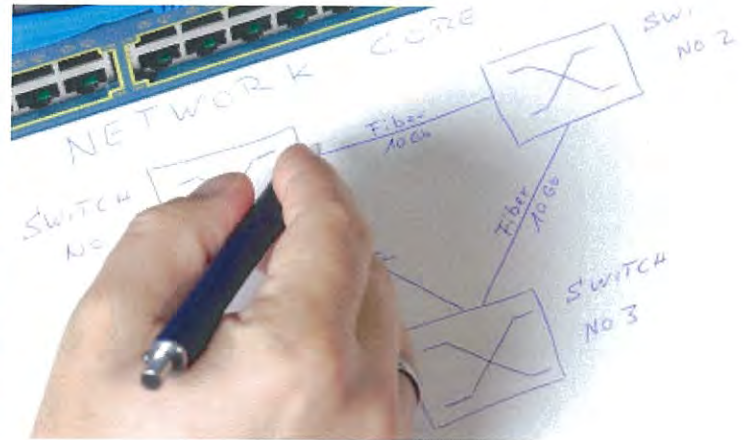
Attached please find some additional information on Matrix Design Group as well as some of services we have done for our customers.

Millennium Communications has great experience in IP voice and data communications. Attached please find a list of some of the customers we have helped with mission critical Unified Communications or VoIP deployments.

We hope that the Massachusetts Broadband Institute's firsthand knowledge of both our company and our work along with the attached information satisfy the question of whether our organization possesses the desired qualifications asked for in this RFQ.



From Concept To Completion



Serving all landscapes across the country, we specialize in fiber optic network deployments, civil engineering, and complete broadband solutions. Our mission is to enable communities, cooperatives, municipalities, and utilities the ability to provide best-in-class broadband communications networks. From feasibility studies, budgeting, underground conduit and aerial cabling, to bridge crossings and outside plant construction, Matrix will provide everything from concept to completion.

Our Experience

As a full service civil engineering and telecommunications design firm, we will perform a variety of public and private sector projects ranging from complete communications networks to storm water management strategies. Whether it's planning the migration of a legacy copper plant, designing a new Fiber To The Premises (FTTP) network, or providing turnkey outside plant managed services, Matrix provides value and savings by being the only go to source for all your project needs.

Our Staff

Our professional staff strives to understand the complexities of each project in order to develop an efficient and effective engineering solution. Our success is built on providing a transparent project environment where clients and their partners are actively involved in the process. We offer unmatched professionalism through a stringent quality control program. Matrix is dedicated to delivering the best services that meet our customers' needs.

Our Promise

We are dedicated to providing next generation technology to all of our industries. We strive to deliver an infrastructure capable of handling the fastest broadband so that our clients can reap the benefits of having the most reliable network. By having Matrix design and engineer a communications system capable of handling big data, our clients get a fast, reliable network infrastructure capable of growing with their business operation.

In addition, we will provide civil engineering services that help our clients solve their toughest challenges. From storm water and environmental services to transportation and traffic engineering and planning, we strive to serve our markets with the utmost quality to deliver the most robust project solutions.





Client: Rutgers, The State University of New Jersey

Project: Rutgers University RUNet 2000 Telecommunications OSP Design

Location: Throughout New Jersey

Background

The State University of New Jersey, welcomes over 50,000 students every year. It is one of the nation's leading universities with 7 campuses located in New Brunswick, Piscataway, Newark and Camden, New Jersey. In order to maintain their leading university status, they needed to create a comprehensive and advanced data, video, and voice communications infrastructure that would meet the challenges facing Rutgers in the Information Age.

Rutgers recognized the need to improve its communication infrastructure and network capabilities. Soon after, the university published a Strategic Plan entitled, A Vision For Excellence, which clearly specified that in order to achieve the goals stated within the document, a robust, reliable network infrastructure was deemed necessary. From this idea, RUNet 2000 was born.

Solution

To help move Rutgers towards their goals, Matrix Design Group, provided an engineering and design solution coupled with project management and construction services for the implementation of the Rutgers RUNet 2000 project, the largest project of its kind at an American university, to meet the communications needs of the university well into the next century.

The design included 100 miles of on-campus duct bank and overhead fiber optic backbone systems across six (6) main campuses. The backbone completion phase included 340,000 feet of underground conduits, 150 manholes, and 50 aerial poles. In addition to all Rutgers' residence halls, the RUNet system was connected to all campus academic buildings, libraries, sports arenas, campus centers, student centers and recreation centers.

Utilizing advanced Global Positioning System (GPS) technology, Matrix prepared as-built mapping of the entire system. More than 750 buildings were located with associated database information embedded in the subsequent graphic elements. Detailed data dictionaries were designed based on client requirements to ensure continuity, system performance and functionality. All final mapping is geo-referenced into the appropriate coordinate system to create a university wide telecommunications GIS layer. Subsequent projects included connecting fiber optic cabling to the universities alternative energy windmills, electrical transmission points, and additional new construction buildings.

Matrix has helped Rutgers provide technology-based innovation in research and instructional programs, administrative procedures, and information systems through a robust, reliable network infrastructure capable of handling the needs of their faculty, staff and students.

Project Goals

Provide technology-based innovation in research and instructional programs, administrative procedures, and information systems

Build a robust, reliable network infrastructure capable of supporting client/server administrative systems

Assist in positioning Rutgers in the top quartile of research universities

Upgrade network to permit high-speed data transport, interactive video transmitting, and improved voice applications

Link Rutgers academic and residential buildings through an integrated data, voice and video network





Client: ECFiber

Project: East Central Vermont Community Fiber-Optic Network

Location: Vermont

Background

Having been continually overlooked in their quest for adequate broadband service by the incumbent service providers, 23 towns in east central Vermont banded together in 2008 to explore building a community owned fiber optic network. As the traditional carriers did not find it cost effective or profitable enough to provide high speed bandwidth in their towns, this group of communities decided to take control of the situation. Their cause has resonated throughout rural communities all over the country.

East central Vermont is made up of some of the most rural communities in the United States. These communities recognize that reliable broadband is more than just a matter of profitability; in some cases it's about the very survival of their communities and the rural way of life. The collection of towns formed an organization, known as ECFiber, and through grass roots action in their respective communities, they sought out and received overwhelming community support to build and run their own Fiber To The Home Network (FTTH). When they needed the expertise to help them carry out the plan, they found it in Matrix Design Group.

Solution

Matrix Design Group began working with the ECFiber Governing Board, helping to identify the right network design to suit the needs of the community today and tomorrow. Matrix designed a robust network that would connect all 23 towns and all of the homes and businesses within the towns to the outside world. Additionally, Matrix provided capital budgeting oversight for the network plan, including preparation of the financial documents necessary to go to the public markets and managerial support at multiple meetings, both internally and externally.

When the public bond market collapsed, Matrix, without missing a step, redesigned the network to match the much more limited resources available to the project; resources that relied on local grass roots funding by the very people that would use the network. Matrix used its years of experience in designing, building, and operating complex fiber based networks to totally redesign the network to suit the very limited budgets. Although just as viable as the original design, the new design captured the essence of what Matrix is all about; designing and building to meet our client needs, within their budget. This new network, which is operational today, combines innovative thinking, solid engineering and cost effective construction techniques, to deliver world class FTTH service to rural communities in Vermont.

“Matrix has provided an invaluable service to the citizens of East Central Vermont. Our ambitious plan to take control of our future broadband needs was met by a company that stepped right up and made themselves an integral part of our team. We’re grateful for their guidance and contribution to our project. Without their truly innovative design, we may not be where we are today, delivering real broadband to areas of our State that may have never gotten it otherwise”

Loredo Sola,
Chairman, ECFiber





Client: Vermont Telecommunications Authority (VTA)

Project: "Middle-Mile" Fiber Optic Broadband Network

Location: Vermont

Background

The VTA, an independent agency of the State of Vermont, was created in 2007 for the purpose of expanding access to broadband and mobile telecommunication services for Vermont residents. As a small, rural state with rugged terrain, Vermont has difficulty attracting broadband Internet providers, who are often unable to build profitable business models for serving the state. The VTA's goal was the development of a 773 "middle-mile" fiber-optic network in Southern, Central, and Northeastern Vermont. The project would connect over 340 community anchor institutions in the project area, encompassing seven of Vermont's fourteen counties.

In 2011, the National Telecommunications and Information Administration (NTIA) awarded VTA with a \$33.4 million dollar grant from the Broadband Technology Opportunities Program. This accomplishment allowed VTA to start soliciting Engineering and Design firms to design open fiber optic networks that would provide data transport services up to 1 Gbps to community anchor institutions, government agencies, and "last-mile" providers throughout the project area.

Solution

Matrix Design Group was selected as an engineering and design consultant to design 27.4 miles of fiber optic infrastructure from Hardwick to Irasburg. In addition to the design of the fiber optic network, Matrix provided additional support services including verification of pole line and underground routes, GIS data collection of pole stock and potential customer sites, preparation of make-ready applications, make-ready joint walk services, utility ride-out with all pole attachments, verification of utility make-ready estimates, material selection and budgeting, construction specifications for a draft RFQ, and optical fiber loss budget calculations.

With the help of Matrix, the VTA was able to offer wholesale data transport services to providers such as Internet Service Providers (ISP's), telecommunications organizations and cellular companies. Matrix designed a network that provides 1 Gbps connections, allowing increased build-outs to additional community anchor institutions such as K-12 schools, libraries, colleges, state government offices, and public safety communications networks throughout the state of Vermont.

Results

The network now brings upgraded broadband and cellular service to areas of the state.

This "middle-mile" network gives educational institutions increased opportunities through media-rich on-line learning.

Brings improved patient care through the support of Electronic Health Records, including transfers of large medical imaging files.

Supports an increase in web-based interactions from state residents to state agencies and reduces state costs of travel and data center space through video conferencing and data center consolidation.

Gives the public access to super high-speed broadband service at public libraries and educational institutions.





Client: Level (3) Communications

Project: Newtown, PA to Newark, NJ

Location: Newtown, Pennsylvania to Newark, New Jersey

Project Description

This two year, 56-mile project from Newtown, PA to Newark, NJ crossed 14 bridges (including the Delaware, Raritan, Rahway, and Elizabeth Rivers), required review and permitting from 15 townships, 4 counties, and 2 states, crossed 14 railroads (including Conrail, NJ Transit, and Amtrak), and necessitated the review of 9 environmental and historic state agencies. The bulk of the permitting was completed within the first four months of the project. The final routing alignment utilized the NJ State Route 1 corridor to achieve its goal of linking the Washington D.C. backbone with the Connecticut backbone. Matrix Design Group was responsible for project management and administration, utility data collection and verification, conceptual/preliminary/and final running line design, directional drill design, ROW permitting, environmental investigation and permitting, bridge attachment design and permitting, rail crossing design and permitting, and the development of construction and final bid documents.

About Matrix Design Group

Serving all landscapes across the country, we specialize in fiber optic network deployments and complete broadband solutions. Our goal is to enable communities, cooperatives, municipalities, and utilities the ability to provide best-in-class broadband communications networks. From feasibility studies, budgeting and underground conduit and aerial cabling, to bridge crossings and outside plant construction, we provide everything from concept to completion.

Contact:

11 Melanie Lane, Unit 14
East Hanover, NJ 07936

matrixdg.com

866.792.9930
info@matrixdg.com





*One Point of Contact.
Endless Possibilities.*

Name: Newark Office of Emergency Management

Contact: Bill Bishop

Phone: (973) 877-9259, Ext 9261

Email: bishopb@ci.newark.nj.us

Provided all labor and equipment for the upgrade

Completion Date: March 2015

Project Description: Our solution included unified communication applications such as; unified communications manager, unity connection for voicemail and voice gateway routers with SRST for full redundancy and a fail over system. The solution also included an emergency notification system called Informacast that allows districts to send text and voice messages to the IP Phones. This allows the district the ability to record and track down 911 calls as they are being made within the area. A cloud and virtualization software called VMware was also part of the solution. Finally, we upgraded their phone system to Cisco 7916 and 7945 Phones.

Fairfield Public Schools

Completed: September 2010

Contact: Mr. William Stepka, Business Administrator

(973)227-1340

stepkaw@fpsk6.org

Project Description: Installation of Cisco VoIP solution with Cisco 2921 Routers at each Board of Education location with SRST for redundancy throughout the district. This solution also included the installation of Cisco 7911 IP phones for classrooms, Cisco 7942 IP phones for Office Administrators, voice mail system for both the schools with accessibility to the voice mail system from both locations, 4digit dialing between schools, and Extension Mobility.

Name: Byram Township School District Project

Contact: Jeremy Slockbower

Phone: (973) 347-1047, Ext 2111

Email: slockbower.jeremy@byramschools.org

Provided all labor and equipment for the upgrade

Completion Date: August, 2013

Project Description: Our solution included unified communication applications such as; unified communications manager, unity connection for voicemail, IM & presence server for soft phones and Jabber Clients, and voice



*One Point of Contact.
Endless Possibilities.*

gateway routers with SRST for full redundancy and a fail over system. With Jabber Client the district is able to collaborate more effectively using desktop sharing and video conferencing features. We also included Informacast, an emergency notification system that allows districts to send text and voice messages to the IP Phones. Informacast allows the district the ability to record and track down 911 calls as they are being made within the area. Finally, we upgraded the network and implemented Cisco's 2960S switches in stack, connecting back via 10G fiber to the core switch. Our solution included Cisco 8945, 6921 and 7937 Phones.

Name: Jersey City Office of Emergency Management

Contact: Director W. Greg Kierce

Phone: (201) 547-5681

Email: WKierce@NJJCPS.ORG

Provided all labor and equipment for the upgrade

Completion Date: 2015

Project Description: Our solution included unified communication applications such as; unified communications manager, unity connection for voicemail, IM & presence server for soft phones and Jabber Clients, and voice gateway routers with SRST for full redundancy and a fail over system. With Jabber Client the facility is able to collaborate more effectively using desktop sharing and video conferencing features. Our solution also included upgrading the network by implementing Cisco's 3750X switches in stack and BE6000 server. Finally, we installed Cisco 8945, 8831, and 9951 Phones.

Name: Newark Housing Authority

Contact: Venny Diaz

Phone: (973) 273-6368

Email: VDiaz@NewarkHA.org

Provided all labor and equipment for the upgrade

Completion Date: 2014

Project Description: Our solution included unified communication applications such as; unified communications manager, unity connection for voicemail, IM & presence server for soft phones and Jabber Clients, and voice gateway routers with SRST for full redundancy and a fail over system. With Jabber Client the facility is able to collaborate more effectively using desktop sharing and video conferencing features. Our solution also included



*One Point of Contact.
Endless Possibilities.*

upgrading the network by implementing Cisco's 3750X switches in stack and BE6000 server. Finally, we installed Cisco 9971, 7916, 7965, 7975, and 7911 Phones.

Name: Tinton Falls Board of Education

Contact: Brian M. Auriemma

Phone: (732) 460-2400, Ext. 2427

Email: bauriemma@tfs.k12.nj.us

Provided all labor and equipment for the upgrade

Completion Date: 2014

Project Description: Our solution included unified communication applications such as; unified communications manager, unity connection for voicemail, IM & presence server for soft phones and Jabber Clients, and voice gateway routers with SRST for full redundancy and a fail over system. With Jabber Client the facility is able to collaborate more effectively using desktop sharing and video conferencing features. Our solution also included upgrading the network by implementing Cisco's 3750X switches in stack and BE6000 server. Finally, we installed Cisco 8945 and 9951 Phones.

RESPONSES TO SECTION 3.3 KEY QUESTIONS

Below please find the responses to the seven key questions listed in Section 3.3 of the RFQ:

- What other rural networks of similar scale and density do you currently operate?

Our expertise has been in designing and building fiber networks. Even though we maintain the fiber and VoIP equipment for EC Fiber in Vermont (through their subsidiary ValleyNet) it would not be fair to say we operate their network. Even though we operate many networks of similar size but of more complexity – those networks are for enterprise customers and municipalities not rural residential subscribers.

- What other rural networks of similar scale and density have you built and/or extended?

We have designed and built the GPON FTTH network for EC Fiber in Vermont. We have also built the Active Ethernet FTTH network and are in the process of doing the final fiber design for the Town of Leverett in Western Massachusetts.

- Typically what level of coverage would you provide in rural areas (in terms of % of currently unserved homes that you propose to pass)?

This RFQ response is specific to the Town of Hardwick where we plan to build fiber past 164 of the 258 unserved homes in town (number of unserved homes via the Hardwick Broadband Committee). We plan to offer initial service of up to 50 Mbps at competitive rates. It has been our experience that “take rates” in unserved towns and communities is normally between 70-80%.

- How could the towns or the state incentive you to provide coverage that exceeds 96%?

The financial resources and incentives needed for Matrix Design Group to go forward with this build are detailed in the **Proposed Fiber Build Financial and Logistic Requirements** section of this RFQ response. Our plan combined with existing Comcast commitments should bring the number of served homes in Montague to over 97%.

- What combinations of technologies would you deploy to enable coverage in your potential Broadband Expansion Project?

We plan to deploy a GPON FTTH network utilizing Calix ONT and OLT gear. The VoIP services would be via Metaswitch or equivalent equipment.

- What services would be made available to on-net subscribers? How would those services differ from currently served residents of each town (in terms of price and product description)?

We plan to offer both high speed Internet (up to 50 Mbps) and VoIP services. Our focus will be on unserved residents. We do not plan to offer any video (other than OTT) products or services.

- Based upon your experience, over what timeframe does this type of deployment contemplated by this RFQ typically take to implement?

Assuming there are no extraordinary delays to the make-ready process – we would look to have the first subscribers lit up in about 12 months from the time of the agreement. Full proposed network build should be complete with 18-24 months.



Project Management
Telecommunications
Civil Engineering
Permitting
FTTH

REFERENCES

(See Attached)



Newark Emergency Operations Network

**Turnkey Fiber-To-the-Premise (FTTP) Network
Completed – November 2013
Value- \$1,200,000**

Complete design/build services of a 12 mile Private Fiber-To-The-Premise network for the Newark Police Emergency Operations Center, including the design and procurement of the central Emergency Management Center. The project covered design, procurement, and turnkey construction services for the connection of 19 buildings to a state of the art fully redundant fiber optic network. Each building was interconnected to each other as well as a central command state of the art Emergency Operations Center. Six fiber strands were dedicated to each building within the network. The buildings were interconnected with Cisco System Active Ethernet electronics, providing dedicated 10Gbps links to and from all EOC facilities. The network is delivering full voice, video, and data services to all 19 locations.

Our scope of work on this project included: A preliminary network feasibility study to determine the viability of network ownership compared to traditional leased network options, a pre-engineering study, assistance with Federal Homeland Security Grant preparation and submittal, make ready services, network design, procurement, construction, and commissioning services. Our company provides full emergency 24x7x365 emergency services coverage, remote systems monitoring, and routine maintenance services. All work on this project was performed by crews from Millennium Communications and Matrix Design Group Inc.

Contact:
Lorenzo Maldonado, Jr.
Lieutenant of Police
Newark Police Department
480 Clinton Avenue, 3rd Floor
973-733-6298

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management



Newark Housing Authority - Fiber Optic Network / Security

Turnkey Fiber to the Premise (FTTP) Network

Completed: 2012

Value- \$10,000,000

Complete design/build services of a 35-mile Private Fiber- to-the-premise network for 40 locations of the Newark Housing Authority. The project covered design, procurement, and turnkey construction services for the connection of 40 buildings to a state of the art fiber network. Six fiber strands were dedicated to each building within the network. The buildings were interconnected with Cisco System Active Ethernet electronics, providing dedicated 10Gbps links to and from all NHA facilities. The network is delivering full voice, video, and data services to all 40 locations.

Our scope of work on this project included: A preliminary network feasibility study to determine the viability of network ownership compared to traditional leased network options, a pre-engineering study, assistance with Federal Housing

Authority Grant preparation and submittal, make ready services, network design, procurement, construction, and commissioning services. Our company also provides full 24x7x365 emergency services coverage, remote systems monitoring, and routine maintenance services. All work on this project was performed by crews from Millennium Communications and Matrix Design Group Inc.

Contact:

Nehru Nadella

(973) 223-8953

nnadella@NewarkHA.org

F: 973-792-9126

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management



ValleyNet Fiber Optic Broadband Network Design / Build

Turnkey Fiber to the Premise (FTTH) Network

Completed: July, 2010

Value to Date: \$ 1,300,000

Total Contract Value at completion: \$18,000,000

Serving as the principle design build contractor for ValleyNet/ECFiber, Millennium Communications Group, Inc. and Matrix design group have overall responsibility for all network design build activities for the project. Using all of Millennium's past experience in designing fiber optic networks, our staff was able to design a new revolutionary FTTH network that reduced the capital cost of constructing the network by more than 40%. This new design makes it very cost effective to place fiber in the most rural parts of the State, areas that because of cost were previously off limits. The prototype network connected over 150 rural homes and businesses throughout East Central Vermont in the towns of Barnard, Bethel and Royalton. In addition to network design and construction, Millennium/Matrix recommended and procured all of the equipment required to build the project inclusive of all outside plant material and electronics.

To date, there are more than 50 miles of active plant with over 300 fully connected customers. Because of the unique financing scheme, the project has a 10 year build out plan, which upon completion will cover more than 1400 miles of roads, passing 17,000 dwellings, most of which would have remain unserved without this invaluable community driven project.

Our scope of work included verification of pole line and underground routes, GIS data collection of pole stock and potential customer sites, preparation and submittal of make-ready applications, make-ready joint walk services, verification of utility make-ready estimates, equipment selection and procurement, complete construction services, field inspection services, construction project management services and project documentation.

Contact:

Tucker Cruikshank

(802)-989-6221

tucker.cruikshank@ecfiber.net

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management



ValleyNet Fiber Optic Broadband Network Design / Build

FTTH Customer Connection Services

Completed: On Going

Value to Date: \$ 150,000

Millennium/Matrix is responsible for all of the customer install activities from the network point of presence to the network interface device (NID) at the customer home. Millennium/Matrix chose and procured a combination of GPON and Active Ethernet equipment from Calix, a leader in FTTH industry hardware and services. As part of the drop installation services, we have full interaction with the customer, to locate the network equipment as per the customer's wishes, while insuring that the location chosen is optimum for making the final connections to the interior of the home.

The services include customer drop installation, NID installation, back-up battery installation

connection and verification of service to the customer location.

The project, by its location, has very significant historical relevance, with many structures dating back to the early 1800's, some even earlier. This, coupled with the scenic vistas prevalent throughout the project area, requires due diligence on the part of our crews, not to disturb the rich history of the region.

Contact:

Tucker Cruikshank

(802)-989-6221

tucker.cruikshank@ecfiber.net

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management



ECFiber – East Central Vermont Community Owned Fiber Network

FTTH Project Consulting

Started: 2008

Completed: 2010

Value to Date: Pro Bono

Millennium/Matrix are firm believers in the power of community owned fiber networks. At the core of our business, we have focused on giving communities the power to control their future networking needs through ownership of the network, in lieu of reliance on the “for profit” telecommunications providers. Our core group of employees has vast experience in OSP networking and advanced network technologies, many with more than 33 years of individual experience. We brought this experience to bear when the communities of EC Fiber were looking for network planning and implementation guidance. We provided technical, managerial and budgeting expertise to the East Central Vermont Fiber to the Home initiative. The project consisted of 22 towns in East Central Vermont forming a consortium to build their own Fiber to the Home network. The residents, tired of being ignored by the

incumbent carriers and cable companies, voted overwhelmingly to undertake the task of building their own state of the art FTTH network. When complete, it will contain more than 1400 miles of fiber connecting every home in the serving area with high speed true broadband network speeds (20mbps) and be the first such network of its kind in the United States. Millennium/Matrix provided support services including budgeting, technical assistance, RUS application services, NTIA application services (stimulus funding) and project management services. The project budget is \$66,000,000 and will be among the largest public works project ever undertaken in Vermont. Millennium/Matrix proudly served this grass roots effort and is proud of its continued roll in the implementation of the final plan.

Contact:

Loredo Sola (Past Chair)

(802) 236-0735

loredo.sola@gmail.com

Millennium / Matrix Provided Services

- Outside Plant
- Network Prototype
- Equipment review and selection
- Budgeting
- Technical writing for incorporation into prospectus
- Operational review



Vermont Telecom Authority (VTA)

Middle Mile/Last Mile FTTH Network

Working with the Vermont Telecom Authority, we have designed more than 100 miles of fiber optic network that is capable of being leased to a network provider at deeply discounted rates. The VTA, charged with providing broadband service to the most remote areas of Vermont, enlisted Matrix/Millennium to help in its quest to build a multi faceted network, capable of supporting all forms of fiber network services. Matrix developed a design, which incorporated the many advantages of the ValleyNet Network, while building in plenty of spare capacity for other services and/or providers. The first portion of the network is underway, with more than 20 miles of network up and operational. There are two service providers currently utilizing the network, one for middle mile applications and

one for last mile applications.

Millennium/Matrix provided complete turnkey services on the design build portion of the network, and is currently performing customer installation services for the last mile provider.

Fabian Bourgeois
Project Manager
Vermont Telecom Authority
Capital Plaza
100 State ST, Suite 342
Montpelier, VT 05620-3205
fbourgeois@telecomvt.org
(802) 828-4655

Millennium / Matrix Provided Services

- Engineering
- Design
- Procurement
- Construction
- Commissioning
- Maintenance
- Emergency Services



Picatinny Arsenal

Turnkey Fiber to the Premise Network
Completed: 2005

Design and engineering of a turn-key Fiber to the premise network, connecting 27 buildings and within Picatinny Arsenal base. Responsibilities included OSP route assessments for aerial installations, ISP building design for the deployment of vertical and horizontal hybrid structured cabling, procurement of material, construction and project management. All documentation and testing was compiled for the work completed at the base.

Contact:
Picatinny Arsenal
Jackie Barnum
(973) 724-5232
Jackie.barum@us.army.mil



US Department of Housing and Urban Development

Completed: Ongoing

Design and engineering of a private fiber network for multiple facilities around the United States. The projects entail the design and engineering of fiber optic cable connections to 32 buildings throughout the Cities, back to a main distribution facility. The network infrastructure designed consists of 10Gbps. Cisco Systems transport equipment installed at the newly cabled facilities. After completion of the project the clients were able to significantly decrease monthly telecom charges by canceling Internet circuits to the 32 buildings.

Contact:
Debra Toothman - CFO
973-273-6410
dtoothman@newarkha.org

Millennium / Matrix Provided Services

- Consulting
- Engineering
- Design
- Procurement
- Construction
- Customer Drop Installation

Passaic County Fiber Network

Turnkey Fiber-To-the-Premise (FTTP) Network Completed – February 2010
Value- \$16,500,000

In 2005 Passaic County, in New Jersey, comprised of 16 individual Townships, saw the need to share resources between its different entities. The County understood that the bandwidth required for sharing data, voice, and video would be very expensive if leased from a local carrier. After researching the ownership of private fiber optic networks, the County enlisted Millennium Communications Group to provide consulting and construction services for this project.

Millennium assembled a team of in-house Civil and Optical Engineers to plot and design the network. This enabled Millennium to identify the number of fiber optic strands necessary to connect all of the facilities in a ring topology. The design was approved and construction began on a 90-mile geographically redundant network, having 6 strands of single-mode fiber delivered to every County-owned facility.

Performing site surveys at all of the facilities revealed that the County's current switch infrastructure was antiquated and unable to utilize the full potential of the fiber optic ring. Millennium's solution was to install Cisco Systems Ethernet switch equipment in all facilities to take advantage of the diverse ring topology and deliver 1 Gigabit of fully redundant bandwidth to each facility. Cisco 6509E core switches with high availability switch fabric blades were used at the core layer. At the access and distribution layers, Cisco 3750 switches were installed to take advantage of Cisco stack-wise technology. To protect the network from malicious attacks, Cisco ASA devices were installed at the core layer of the network. With the successful installation of the fiber optic cabling and the network equipment, the County was able to realize an immediate cost

savings by canceling all of the point to point T-1 connections that used to serve as the gateway for the network traffic.

To further utilize the new fiber infrastructure, the County installed a VoIP phone system. This allowed the County to call between all of its facilities toll-free over the fiber network. The new VoIP system also gave the County advantages such as centralized voice mail, unified messaging, and ease of configuration management. Additionally, the county was the able to cancel a large number of phone circuits at each facility and reduce overall call-related charges on their remaining lines resulting in a large reduction in total phone costs. In today's security minded climate, monitoring the critical locations in any county is crucial. Using the fiber network, Millennium was able to deploy hi-resolution surveillance cameras at several critical locations and transmit that video back to a central monitoring and storage location. This allows the County agencies to monitor these sites for any undesirable activity with real-time video and respond accordingly.

Millennium has extended Managed Services to the County to provide hardware and software maintenance and support. In addition, Millennium also provides the NOC and monitoring services for the data and voice networks. All management information is sent back to our facility where our technicians watch for alarms and open service tickets in our system until a resolution is reached. Millennium's Managed Services team also provides on-site and remote support, software updates, and training to the County's MIS team.

Contact:
Walt Hanson CGCIO
(908) 325-3700
mgmt@atoncomputing.com

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management



Newark Emergency Operations Center

**Turnkey Fiber-To-the-Premise (FTTP) Network
Completed – November 2013
Value- \$9,000,000**

The city of Newark formally had inconsistent technology on an unreliable copper network infrastructure. When it rained, the reliability of the network was shaky at best. Once they made the decision to make advances toward better technology, they recognized that it wouldn't be possible given their existing infrastructure. After realizing the benefits of a fiber infrastructure, the City of Newark, the Newark Police Department and the Office of Emergency Management further saw an opportunity to share their applicable resources. The Newark Housing Authority already owned the pole space which hosted most of their newly installed fiber network. By utilizing some of the NHA's existing Right of Way, the City of Newark, the Newark Police Department and the Office of Emergency Management realized the benefit to using a fiber optic infrastructure that would be utilized by each party. After deciding

to build an Emergency Operations Center (EOC) within the same building as the new city police headquarters, fiber became the principal focus. By sharing their existing Right of Way, the NHA was able to connect themselves to the Newark Police Department and by the end of the project all 3 entities would be able to share camera footage and databases that align to the greater good of the community.

With location at the heart of the decision to build a new Emergency Operations Center, along with the ability to share the Right of Way for their fiber deployment, and the proposed new construction of the Newark Police Department, Newark was quickly on their way to becoming a predominant leader in 21st century technology.

Contact:
Lorenzo Maldonado, Jr.
Lieutenant of Police
Newark Police Department
480 Clinton Avenue, 3rd Floor
973-733-6298

Millennium / Matrix Provided Services

- Consulting, Engineering, Design
- Procurement
- Construction
- Commissioning, Provisioning
- Customer Drop Installation
- Maintenance
- Emergency Services
- Network Management

Newark Emergency Operations Network
Lorenzo Maldonado, Jr.
(973) 733-6298
maldonadol@ci.newark.nj.us

Newark Housing Authority- Fiber Optic
Network/ Security
Nehru Nadella
(973) 792-9126
nnadella@NewarkHA.org

ValleyNet Fiber Optic Broadband Network
Design/ Build
Tucker Cruikshank
(802) 989-6221
Tucker.cruikshank@ecfiber.net

ECFiber- East Central Vermont Community
Owned Fiber Network
Loredo Sola
(802) 236-0735
loredo@gmail.com

Picatinny Arsenal
Jackie Barum
(973) 724-5232
Jackie.barum@us.army.mil

US Department of Housing and Urban
Development
Debra Toothman
(973) 273-6410
dtoothman@newarkha.org

Passaic County Fiber Network
Walt Hansen, CGCIO
(908) 325-3700
mgmt@atoncomputing.com

Fabian Bourgeois
Project Manager
Vermont Telecom Authority
Capital Plaza
100 State ST, Suite 342
Montpelier, VT 05620-3205
fbourgeois@telecomvt.org
(802) 828-4655

- AboveNet Communications
 - Adesta Communications
 - Allegience Telecom, Inc.
 - AT&T Local Services
 - Allied Signal
 - Cable & Wireless USA, Inc.
 - Clearstream Communications, Inc.
 - Columbia Transmission Corp.
 - Connecticut Department of Transportation
 - County of Morris
 - Enron Broadband
 - Fast Track Construction
 - Fluor Global
 - GTS Network Limited
 - J. Fletcher Creamer & Son
 - Lightpath
 - Lucent Technologies
 - MCI Worldcom Network Services
 - Marriot International
 - NorthEast Optic Network, Inc.
 - New Jersey Dept of Transportation
 - Peter Kiewit & Sons Construction
 - Rutgers University
 - Southeastern University Research Association
 - Sprint PCS
 - Telia
 - Verizon Communications
 - Zayo Group
 - New York State Unified Courts
 - Aguilar Environmental
 - Arbro
 - Bechtel Telecommunications
 - Chalet Suisse Motels
 - Cablevision
 - Citicorp
 - Con Edison Communications
 - Crystal Springs Builders
 - Charter Ridge
 - ExtraNet Communications
 - FiberNet Telecom group
 - G4S Technologies
 - Geographic Network Affiliates Int'l
 - Insignia/ESG
 - Level 3 Communications
 - Looking Glass
 - Mansion Ridge Golf Course
 - Metromedia Fiber Network Services
 - Nabisco, Inc.
 - Novartis Pharmaceuticals
 - OnFiber
 - Qwest Communications
 - SNET
 - Sprint Communications
 - Switch & Data Facilities Co.
 - Time Warner Telecom
 - Verizon Wireless
 - XO Communications
-

David S. Isenberg
112 Orchard St.
Cos Cob CT 06807
isen@isen.com
May 29, 2013

Re: Ron Cassel

To Whom It May Concern:

I am writing to endorse Ron Cassel's long experience in the matter of Internet access networks. I hold a Ph.D (1977) from CalTech, and I was at AT&T Bell Laboratories (1985-1998) where I was awarded the title "Distinguished Member of Technical Staff." I was a Fellow at Harvard University's Berkman Center for Internet and Society (2005-2006), and I served as Senior Advisor to the FCC (2009-2010) on the National Broadband Plan team. Since 2004 I have produced an annual conference about telecom and Internet policy called F2C: Freedom to Connect that emphasizes fiber to the home and community networks.

I first encountered Ron Cassel's work at AT&T Bell Labs. Ron was a key member of a team at Suburban Cable that was working with Bell Labs to build the first real-world cable Internet access system. My house in Westfield NJ was on the Suburban cable network and I got one of the very first prototype cable modems via Bell Labs. Shortly thereafter Comcast bought Suburban, then along came Bill Gates who had heard about Comcast's new cable model technology and wrote a \$5 million check to develop it. This became the @Home network, the first big consumer broadband service. The rest is most definitely history.

Along the way, but independently, Ron's Suburban Cable team installed custom fiber optic connections between several Bell Labs staff members' homes and the Bell Labs facility in Murray Hill NJ for research and application experimentation.

In short, Ron Cassel was an integral part of the team that I knew first-hand that laid the foundations of consumer broadband Internet access in America. There are very, very few people in the USA with as long a history of technical broadband Internet access experience, and almost certainly nobody with more.



David S. Isenberg, Ph.D.
isen.com, LLC

Ron Bommarito

Coordinator of Technical Services
Somerville Public School District
51 W. Cliff Street
Somerville, NJ 08876

We had been attempting to migrate from Verizon SIP service to Optimum Lightpath for over a year. The purpose for this was a huge cost saving and increased bandwidth for the district. During this time our previous Network/Voice vendor had been unable to successfully complete this transition. He spent countless hours attempting to do this with no success and his belief was that the issue was actually Optimum's. He provided two solutions to us. One was to abandon SIP and switch to PRI circuits. This would require the purchase of additional hardware and not allow us the flexibility that SIP provides.

I saw his solutions as unacceptable and costly. The fact that the project had dragged on for a year and no resolution was in sight was a costly issue. We were paying for 2 separate services; therefore, I made the decision to reach out to Prag and asked for assistance.

We scheduled a time to have Prag come out and review our configuration and assist us in finding a solution. Prag arrived on site and spent several hours assessing our system and work with reps and the NOC from LightPath to find the issue. Unfortunately he was only able to get inbound calling or outbound calling working but not both at the same time. It was looking as if we were going to need to purchase a new router to complete the transition.

While we were walking out of the office (at 6pm) Prag had an idea and we went to the server room to look at the configuration. We discovered that we actually had a router in place which we were using for the Verizon SIP trunk. We quickly went back to the office and Prag made some configuration changes on the router and we were able to make inbound and outbound calls at the same time. He validated that we would be able to successfully make the transition from one provider to the other without issue.

Without Prag's help and perseverance the district would have had to continue to pay for redundant services and would also have needed to purchase additional un-budgeted equipment and services to successfully make the transition. He is a tremendous resource as he is extremely professional and dedicated to seeing a job through.

I personally and professionally appreciate Prag's assistance in this situation and would recommend him to my friends and peers without question.

Regards,
Ron Bommarito

KEEP BT LOCAL!
472 North St
Burlington, VT 05401
KeepBTLocal.com

To whom it may concern,

I am the Chairman of the Board of Directors of "Keep BT Local!", a newly formed Vermont-based telecom Coop looking to purchase Burlington Telecom from the city of Burlington and rescue it from past managerial mistakes.

I am also the Chairman emeritus of ECFiber (East Central Vermont Community Fiber), a coalition of 23 towns in East-central Vermont which plans to build, own and operate an FTTP network covering the member towns. When completed, the network will cover about 1400 road miles throughout the serving area. Currently, there are 50 plus miles built, passing about 600 homes with more than 300 customers connected.

As a result of my experience as Chairman of these two organizations I have a keen sense of what it takes to build and operate a successful FTTP network especially in a rural environment. I can wholeheartedly state that the team of Millennium Communications Group and Matrix Design Group have risen above my expectations. They proved to be an invaluable partner in getting the ECFiber project underway. Not only do they possess the design/build expertise needed to get the job done, in addition they bring to the table years of experience and have developed operational innovations that have been very valuable to the project.

Millennium/Matrix have been our sole source for all of the services needed to construct our network including network planning, conceptual design, make ready survey, joint walk, final design, procurement, construction, system turn up, customer installations and maintenance. They are a valuable partner and I would recommend them highly.

Loredo Sola
Chairman of the Board, KeepBtLocal
Loredo.Sola@gmail.com



East-Central Vermont Community
Fiber-Optic Network
415 Waterman Road
So. Royalton, VT 05068
Tel: 802-763-2262
info@ecfiber.net



P.O. Box 323
So. Royalton, VT 05068
Tel: 802-763-2262

March 18, 2013

Subject: Millennium Communications Group/Matrix Design Group

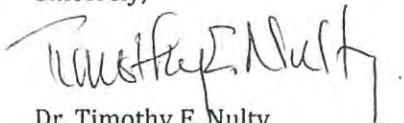
To whom it may concern:

My name is Timothy E. Nulty. I am the Chief Executive Officer of Valley Net, a nonprofit organization, whose sole purpose is the promotion of real broadband service in the rural areas of Northern New England, especially Vermont. I am also the Managing Director of the ECFiber project. ValleyNet has a contract with EC Fiber, LLC, whose members are twenty two towns in East Central Vermont plus the Vermont capital city of Montpelier. The contract engages ValleyNet to design, build and operate a Fiber-to-the-Home (FTTH) network that will ultimately serve every residential, business and institutional premise within the twenty three member municipalities. ValleyNet, in turn, has engaged Matrix Design Group (a subsidiary of Millennium) to assist it in the design of the ECFiber network and to undertake the actual construction of the network.

As part of the endeavour to build and own a state of the art Fiber-to-the-Home network, both ValleyNet and EC Fiber have sought the expertise of Millennium and its CEO, Ron Cassel. Millennium has been instrumental in helping us develop a network design that has made it possible to build universal FTTH network in ECFiber's rural environment much more economically than has been widely believed possible. Millennium/Matrix have also performed very satisfactorily in the actual construction of the network—42 miles of which are now fully in operation and another 80 miles are in various stages of construction.

Millennium and its related company, Matrix Design Group Inc. are our sole contractor for both our FTTH design and construction activities. Millennium has proven itself as a valuable contractor partner, time and time again. I would highly recommend Millennium if so asked.

Sincerely,



Dr. Timothy E. Nulty
CEO, ValleyNet
Managing Director, ECFiber Project

PROPOSED FIBER BUILD FINANCIAL AND LOGISTIC REQUIREMENTS

The Matrix Design Group plan to provide high speed bandwidth to the 164 unserved residents of Hardwick would entail the following:

- Utility pole application fees (Verizon and National Grid) **\$20,500** (to be paid by MBI)
- Engineering fee to submit and shepherd utility pole applications **\$19,200** (fee to be paid by MBI – work to be done by Matrix Design Group)
- Make-ready costs for 749 poles at an estimated \$600 per pole **\$449,400** (to be paid by MBI)
- Installation of 101 new poles to be owned by the town **\$151,500** (to be paid by MBI – work to be done by Matrix Design Group)
- MBI to provide Matrix Design Group with a grant of **\$146,200** to install fiber along the 5.2 miles of road where there is an existing pole line but no unserved homes and along the 3.4 miles of road where a new pole line is to be installed but there are no homes.
- MBI to provide Matrix Design Group with a grant of **\$82,000** to help subsidize the FTTH network build..
- Town to be responsible for police details during both make-ready and fiber installation.
- Home owner to pay \$500 for drop to house during pre-subscription period. If installation requested after pre-subscription period cost to install house drop will be \$1,500.
- Home drop to be up to 300 feet aerial from curb or via usable conduit. If no usable conduit available for underground drop – homeowner to be responsible for installation of conduit.
- Home owner to be responsible for indoor cabling. If indoor ONT with built-in WiFi desired then there will be an additional \$5 monthly equipment fee..
- Town to have option to purchase network for \$763,990 during first three years of operation. After year three the purchase price will decrease by \$44,940 per year. After year-two \$3,500 will be added to the purchase price for each new subscriber added to the network. After five years of operation, the purchase price will no longer include either the subscriber ONT's or the head end OLT electronics.
- After 20-years the town has the option to purchase the network for \$10.

Total MBI Financial Contribution for Hardwick FTTH Build: \$868,80000

The 27.8 mile GPON FTTH build would wholly or partially include the following streets in Hardwick:

- Hardwick Road
- Breen Road
- Mellon Road
- Thresher Road
- Jackson Road
- North Road
- Delargy Road
- Taylor Hill
- Chagnon
- Route 32
- Goddard Road
- Upper Church
- Barre Road
- Ridge Road
- Ruggles
- Czesky
- Lucas
- Greenwich
- Lyman
- Muddy Brook