From: Chris Lynch [mailto:clynch@matrixdg.com]
Sent: Friday, January 29, 2016 11:38 AM
To: Eric Nakajima <nakajima@masstech.org>
Cc: Michael Baldino <baldino@masstech.org>; Maeghan Welford <welford@masstech.org>; Ron Cassel <rcassel@millenniuminc.com>
Subject: RE: Follow-up from discussion at Board Meeting (1/2)

Eric,

Attached please find the summary of the Business Plan (minus any information that may be considered proprietary) that we discussed. The business plan was created by Matrix Design Group and our sister company Millennium Communications Group to invest the capital, design and operational expertise into new LLC's (Newco's) for the Design, Build and Operation of GPON FTTH networks for rural towns or groups of towns in New England.

Hopefully, this business plan summary coupled with the response to the MBI's Supplemental Request for Information dated September 21, 2015 will answer any remaining questions regarding the viability or sustainability of our proposed plans for the Towns of Hardwick and Montague.

Also attached please find a list of the number of poles and road miles for our build in Montague that was compiled by the Montague Broadband Committee in conjunction with Matrix Design Group. We will send over the PDF of the coverage map for the Town of Hardwick electronically in a separate email due to file size. It should be stressed that the number of unserved homes in Hardwick and Montague were cataloged by the Broadband Committees of those two towns as well as via other town resources such as Town Planner and Town Assessor's Office. We feel these numbers represent the most accurate picture of unserved homes in both communities.

As always we enjoy working with the MBI to help solve the problem of unserved towns and communities in Central and Western Massachusetts.

Chris Lynch
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Federal GSA Schedule #70
Contract # GS-35F-0220R
NJ State WSCA Contract #73979
Universal Spin # 143007785

# Rural FTTH Fiber Business Plan Summary
# For Newco

## I. Introduction

For the past 8 years, Matrix Design Group and Millennium Communications Group Inc., have been actively involved in the planning and implementation of true fiber to the home technologies in the most rural parts of New England. Through our early work with a group of 24 towns in East Central Vermont, who collectively formed a consortium to build and operate a community owned FTTH network, we gained valuable knowledge into the challenges facing rural deployment of Fiber to the Home. Working hand in hand with the Governing Board of EC Fiber, we helped to develop a sustainable business plan that was scalable to even the most remote towns involved in the consortium.

Our ability to recognize and overcome the technical challenges of building a sustainable network at a price point to fit the business model became the largest single hurdle to overcome. The challenge was met and today EC Fiber, largely through private community investment, has built a network serving 1300+ subscribers over 350 miles of network. Through the success of this network, EC Fiber is now close to financing the remainder of their build via traditional financing sources.

## II. Construction Understanding the Components

Our model breaks up the construction of the network into three distinct areas. They are, Make Ready, Network Construction, and Subscriber Installation. Each of these components has major implications on the overall success of the business plan and needs careful consideration and oversight to insure a successful outcome.

A. **Make Ready** is the physical activity of making a space on an existing telephone pole line for the placement of a new fiber facility. For this part of the project, the entire fiber network path is determined through field survey. Each pole that will be required to be used for the new fiber attachment is logged to become part of a Make Ready Application. Once enough pole data is collected, the application(s), along with an application(s) fee is sent to the authority in charge of the pole licensing and administration. The utilities then perform field surveys, in some cases with the new attachee present, in some cases without. Once the surveys are complete, detailed estimates are sent to the attaching entity, detailing the cost to make room for the new attachment. The new attachee is responsible for all fees to move existing utilities, replace poles as needed, shore up guying so as to ensure the pole can support the additional cable attachment.

**B. Network Construction** is the actual design and construction of the network. This portion of the project begins when the appropriate pole licenses have been secured from the appropriate utilities. Network Construction consists of all engineering, design and construction of the network pass, that is, the aerial portion of the network passing each home along the existing public right of way.

**C. Customer Installation** is the connection of an individual customer to the network through a drop or service entrance cable. This includes a physical fiber connection from the pole to the subscriber premise, placement of equipment within the premise for receiving service, provisioning equipment to receive service.

While it is easy to measure the need for a broadband deployment in an underserved town, it is more difficult to determine the willingness of the individual residents to subscribe for service. The business plan establishes the three areas above, specifically in order to establish the criteria under which the successful implementation of the plan can occur.

## III. Construction Activities Under Business Model –

**A. Path –** All path and right of way, whether aerial or underground shall be secured by the town. All items covered in Section "A" plus any, permit acquisition, police protection, underground conduit, new pole line or other requirement needed to deliver the complete, unobstructed right of way for the placement of the Fiber Network are needed. Additionally, the town is to provide space to house and power the hubsite equipment, including electronics and termination gear.

**B. Network Construction –** Design, procurement of equipment and materials, and placement of network are the responsibility of Newco. This will include all items under Section "B", through existing underground facilities or overhead on town licensed poles. Construction will commence when the town reaches a predetermined rate of subscription from its residents, under the terms set forth below.

**C. Customer Installation –** Customer installation as described in Section "C" will be performed for each individual subscriber on the network as per the terms and conditions established. Each subscriber will sign a contract for a two year term and pay a connection fee.

## IV. Service Offerings

The project will offer a traditional double play, consisting of Phone and Internet Service.

**A. Phone Service** will be outsourced to a regional white label or other SIP phone service provider such as New River, Core Dial, or Momentum. The service will be delivered through dedicated Ethernet links (redundant) from the service providers soft switch to the POP established by Newco. The service will include unlimited domestic long distance, along with all of the standard features including voicemail, caller ID, call waiting, etc. The service will be fully compliant with E911 requirements.

**B. Internet Service** will be offered at a standard 50Mbps[1] symmetrical rate with no data rate caps[2]. Additional service offerings will be made available up to 400Mbps symmetrical, at published monthly rates. Bulk Internet service will be provisioned from POP established by Newco to Wholesale ISP such as Axia. A DHCP server will provide dynamic Public IP Addresses to Customers. Optional static Public IP Address will be made available at published monthly rates.

## V. Operations

Network Operations will include both a local and remote presence. In large part due to the limited population densities of the service area, it is more cost effective to consolidate back office operations and service from one location. However, there will be a local staff presence to service customer needs.

**A. Remote Network Operations** will provide all back office operations for the system including, accounting, billing, customer service, technical operations, trouble tickets, and other operational aspects of Newco. This service will be subcontracted to Millennium Communications Group Inc., the main investor in the network. The office hours will be from 9-5 PM Monday-Friday, for general billing and service inquiries, technical support, and scheduling of installations or service. In addition, an after-hours customer service hotline will be available 24 x 7 to assist customers with trouble issues.

Millennium has a full staff of business operations personnel, including customer service representatives, accounts payable and receivable clerks, a payroll clerk, financial controller and CFO. The company also employs 6 certified Cisco IP engineers and a CIO, who holds a Cisco CCIE certification in IP phone and networking applications. The CCIE certification represents the highest level of networking certification in the world. Currently, there are 38,000 Cisco CCIE's worldwide.

[1] Peak data rate, speeds may vary.
[2] Subject to the future policies of wholesale internet service providers.

**B. Local Staffing** will provide all day to day customer and maintenance operations requiring truck rolls. This will include installations, service calls, outages, troubleshooting and routine tasks unable to be performed remotely. The preliminary staffing level will be two full time employees, with additional staff being added as required and based on level of subscribership.

**C. Emergency Services** will employ both our local staff members as well as local sources of contract labor, specializing in the repair of the network. Additionally, remote operations on call staff will be available for troubleshooting network issues not connected to the physical plant.

## VI. Service Fee Schedule (Projected)

**A. Residential Internet Service[3] (Monthly)**

| | |
|---|---|
| **Level 1-50Mbps** | **$95.00** |
| **Level 2 -100Mbps** | **$140.00** |
| **Level 3 – 400Mbps** | **$250.00** |

**B. Business Internet Service (Monthly)**

| | |
|---|---|
| **Level 1-50Mbps** | **$110.00** |
| **Level 2 -100Mbps** | **$160.00** |
| **Level 3 – 400Mbps** | **$300.00** |

**C. Residential Unlimited Dialing Phone Plan - $20.00 (Monthly)**

**D. Nationwide Business Unlimited Dialing Plan - $35.00 (Monthly)**

## VII. Miscellaneous

| | |
|---|---|
| **A. Static IP Address** | **$15.00 (Monthly)** |
| **B. Voicemail Per Mailbox** | **$3.00 (Monthly)** |
| **C. Whole House Wireless Router** | **$5.00 (Monthly)** |

[3] Peak data rates, speeds may vary

**Montague Broadband Advisory Committee**
**Proposed Fiber Build Out**
**Roads Miles and Poles for Make Ready**

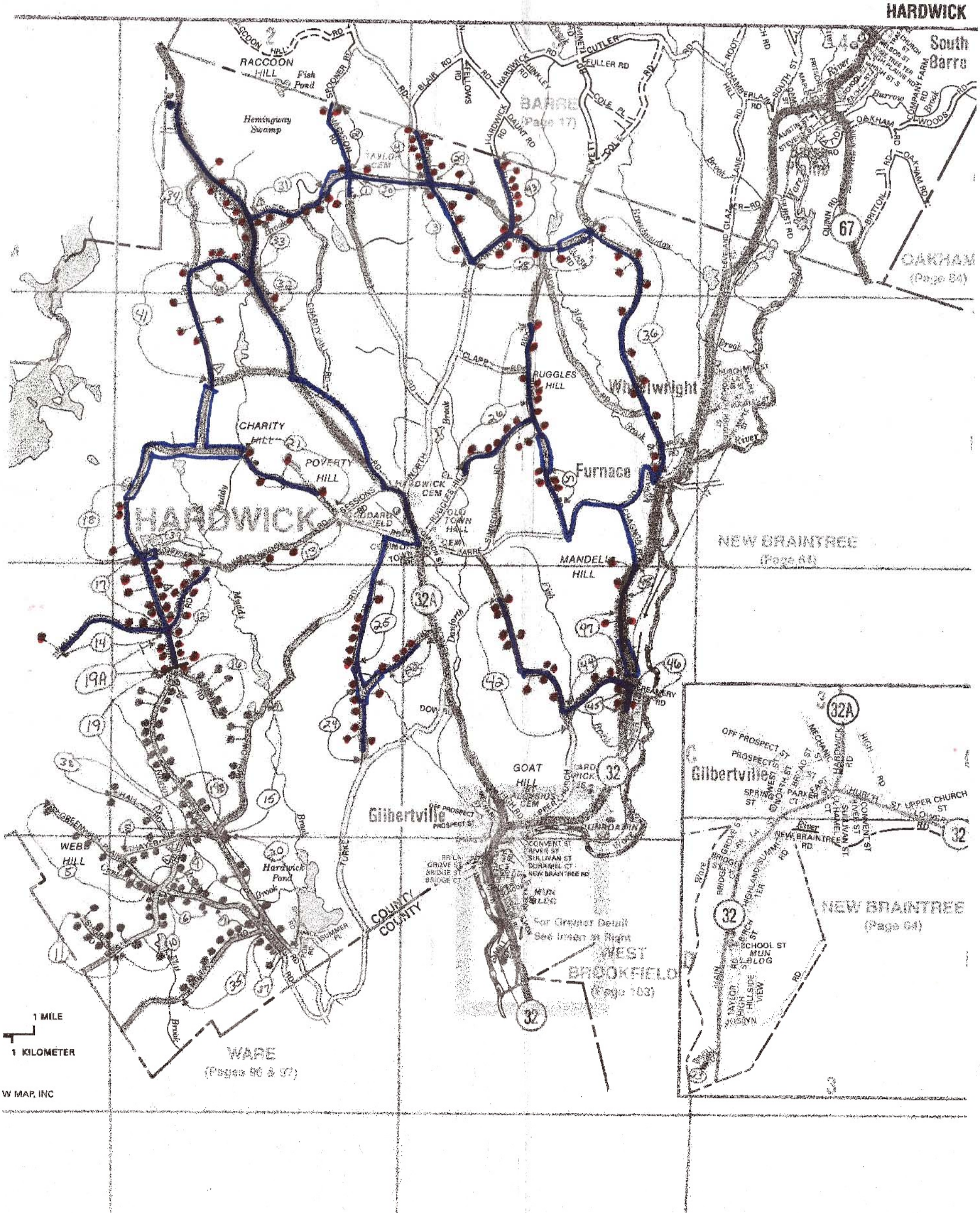
## Extension of CAI to the Montague Center Fire Department:

| | | Poles | Miles |
|---|---|---|---|
| 1. | Start at Montague Police Department - Intersection of Turnpike Road and Turners Falls Road, South on Turners Falls Road to Main Street | 120 | 4 |
| 2. | Main Street to Old Sunderland Road | 23 | .3 |
| 3. | Old Sunderland to MCFD | 9 | .3 |
| | **Total** | **152** | **4.6** |
| | **Make Ready 152 x $600 = $91,200.00** | | |
| | **Estimated Fiber Cost $78,200.00** | | |
| | **Application Costs Verizon and WMECO $2,500 x 2 =$5,000** | | |
| | **Survey, Application completion and Utilities proposal review $4,800** | | |
| | **Police Detail** | | |
| | **Total - $179,000.00** | | |

## Unserved Areas of Montague

| | | **Poles ST** | Miles |
|---|---|---|---|
| 1. | East Chestnut Hill Rd from Loop Intersection to Unpaved section short of Upham Rd | 25 | .9 |
| | 111-1, 118-2, Stohs-5, 152-1, 154-1. 155-1, 161-1, 183-1, 195-1, & 178-1 | 15 | |
| 2. | East Chestnut Hill Road from Loop Intersection SW to house past bridge | 7 | .4 |
| 3.* | East Chestnut Hill Road SW toward Leverett Line NO POLES till house 51 | ----- | .1 |
| 4. | East Chestnut Hill SW from house 51 to Leverett Line | 5 | .2 |
| | 41-1, 46-4, 51-1 | 6 | |
| 5. | Chestnut Hill Loop from Top of E. Chestnut Hill Rd to Intersection of E.&W. Chestnut Hill Rd | 35 | 1.3 |
| | 82-1, ? – 1, 125-1, 127-1, 142-1 | 5 | |
| 6. | Richardson Rd | 2 | .1 |
| 7. | W. Chestnut Hill Rd from Intersection of Chestnut Hill Loop to Ripley Rd | 43 | 1.6 |
| | 29- 1 Pole, 60-3 | 4 | |
| 8. | Ripley Road from Spaulding Brook Rd to Power Lines | 23 | .8 |
| | 133-1 Pole, 98- 1 Pole, 82- 1 Pole (Driveway poles) | 3 | |
| 9. | Ripley to the Retreat | 2 | .1 |
| 10. | Spaulding Brook Rd | 2 | .1 |
| 11. | North Leverett Rd from Leverett Line to Rt 63 | 36 | 1.5 |
| 12. | Sunderland Rd (Rt 47) from Rt 63 to Fosters Rd | 18 | .7 |
| 13. | Fosters Rd to 33 Fosters Rd | 7 | .2 |
| 14. | Main St/ Rt 47 Intersection to Old Sunderland Road | 25 | .8 |
| 15. | Kells Rd (house # 1 & 10) | 3 | .1 |
| 16. | Old Sunderland From Main St to MCFD | 9 | .3 |
| 17. | Old Sunderland Rd from MCFD to House 123 (includes 119,91, 90) | 25 | 1.0 |
| 18. | Old Sunderland Rd house 158-137 end of Taylor Hill before Fosters | 4 | .1 |
| 19. | East Taylor Hill Rd from Old Sunderland to Taylor Hill Rd | 13 | .5 |
| 20. | Taylor Hill Road from Old Sunderland Rd to N. Taylor Hill Rd/ Court Rd | 38 | 1.5 |

| | | | |
|---|---|---|---|
| 21. | Taylor Heights from Taylor Hill Rd | 9 | .2 |
| | 17- 3 Poles, 21 – 2 Poles | 5 | |
| 22. | N. Taylor Hill Rd from Taylor Hill Rd to Meadow Road | 15 | .6 |
| 23. | Meadow Rd From Greenfield Rd to last Pole South along CT River | 38 | 1.5 |
| | 230 - 1 Pole | 1 | |
| 24. | Swamp Rd from Turners Falls Rd to Federal St (Rt 63) | 24 | .9 |
| 25. | Dry Hill Road from Federal St to last house on Dry Hill Road | 35 | 1.5 |
| | 42- 1 Pole, 147-139 1 Pole | 2 | |
| 26. | Hannabrook Lane off Dry Hill | 6 | .2 |
| 27. | South Ferry Rd | 12 | .3 |
| 28. | Wills Ferry Rd | 8 | .3 |
| 29. | Greenfield Road to Main Street by Montague Bookmill | 4 | .1 |
| | **TOTAL** | **512** | **17.8** |
| | **Make Ready 512 x $600 = $309,600.00** | | |
| | **Application Costs Verizon and WMECO $2,500 x 6 =$15,000** | | |
| | **Survey, Application completion and Utilities proposal review $16,000** | | |
| | **Police Detail** | | |
| | **Total - $340,600.00** | | |
| | | | |


RACCOON HILL
Fish Pond
Hemingway Swamp
SPOONER RD
JACKSON RD
BLAIR RD
FELLOWS RD
HARDWICK RD
HINKLEY RD
CUTLER RD
FULLER RD
COLE PL
DAUNT RD
BARRE
(Page 17)
CHAMBERLAIN HILL RD
ROOT RD
SOUTH ST
AUSTIN ST
STEVENS ST
FRITSCHE
MAPLE
River
Burrow
Brook
COMPANY FARM RD
WOODS RD
OAKHAM RD
BRITTON RD
QUINN RD
67
South Barre
OAKHAM
(Page 84)
CHARITY HILL
POVERTY HILL
HARDWICK
HARDWICK CEM
OLD TOWN HALL
COMMON
RUGGLES HILL
CLAPP RD
Furnace
Wheelwright
CHURCH ST
MILL ST
NEW BRAINTREE
(Page 64)
MANDELL HILL
32A
GOAT HILL
32
Gilbertville
OFF PROSPECT
PROSPECT ST
CONVENT ST
RIVER ST
SULLIVAN ST
DUHAMEL CT
NEW BRAINTREE RD
MUN BLDG
For Greater Detail
See Inset at Right
WEST BROOKFIELD
(Page 103)
DOWNEY RD
CREAMERY RD
Dana
Hardwick Pond
WEBB HILL
SHAY RD
SUMNER RD
POINT RD
SUMMER PL
COUNTY
WARE
(Pages 86 & 87)
1 MILE
1 KILOMETER
W MAP, INC
MECHANIC ST
HIGH RD
SPRING ST
WEST ST
NORTH ST
PARK CT
BROAD ST
UPPER CHURCH ST
LOWER RD
NEW BRAINTREE RD
GROVE ST
BRIDGE ST
HIGHLAND TER
SCHOOL ST
BIRCH ST
MAIN ST
TAYLOR HILL
HILLSIDE
VIEW
ROBBINS RD

# LeverettNet vs Matrix Plan for Hardwick and Montague

Matrix Design Group and our sister company Millennium Communications built and did the final network design for the LeverettNet Active Ethernet FTTH deployment in Leverett, Mass. The build was close to 40 miles of fiber network and approximately 820 locations. The network went live in August 2015 and currently the take-rate is about 84%.

The network was funded via a $3.6 million general obligation bond which will be repaid over 20-years via a real estate tax increase.

## Leverett Residential Product Offerings

### Residential Service Levels

- Internet: $24.95
- MLP Fee: $49.95
- Tax Increase: $18.25*

Total "All-IN" Cost for Internet Service = **$93.15 per month**

* The tax increase was originally published as $300 per year for the average house in Leverett but has since been reduced to $219 ($219/12=$18.25/month). Please note that the average home value in Leverett is $275,000.

- Residential phone line with unlimited local and long distance calling may be added at a package price of $39.95 per month creating a new "all-in" cost of **$108.15** per month for Internet and VoIP

Notes:

1. A number of non-profit and religious buildings in Leverett were also provided with fiber drops and ONT's as part of the build at no charge. These groups do not participate in the repayment of the general obligation bond but are included in the "take-rate" figures.

2. Even at an impressive reported take rate of 84% that means 16% of the homes in town will be subject to the on average yearly $219 real estate tax increase but are not participating in taking broadband.

## Matrix Residential Product Offerings

There are currently two (2) service offerings from Matrix:

**Standard Internet:** Up to 50 Mbps Internet connection for $95/month.

**Standard Internet and VoIP:** Up to 50 Mbps Internet connection and VoIP line. The VoIP will allow for unlimited local and long distance calling (lower 48 US States). The VoIP service will come with standard features including but not limited to Caller ID, Call Waiting, 3-Way Calling, etc. Package cost $115/month.

At first blush it would seem that the proposed Matrix Internet offering is very close to the "all-in" cost for Internet in Leverett ($95.00 vs $93.15). However, not included in the Matrix price is the suggested $4.95 monthly MLP fee that Hardwick and Montague would use to pay for the yearly pole rental fees and any other MLP expenses.

In addition the $18.25 per month added to reflect the tax increase in Leverett is just the "average" tax increase. If you are a subscriber to LeverettNet with a home value over $275,000 then you will be paying more. In some cases much, much more than $18.25 per month.

In regards to speeds – the top theoretical speed for a subscriber in Leverett is 1 Gbps. However, LeverettNet has just 2 Gbps in Internet backhaul that is shared by around 690 subscribers. Of course it is unrealistic to think all 690 will be online at the same time but the simple math of 2,000 divided by up to 690 cannot be glossed over.

The $500 installation fee for the Matrix Plan also should be addressed. One way to look at it is that is the cost the Town pays to avoid the risk that goes with a multi-million dollar construction project. Another way to look at it is that is the cost the residents of Hardwick and Montague will pay so that their tax rates do not go up to pay for broadband. Yet another way to look at it is that is the cost Hardwick and Montague pays so that their ability to borrow in the future for big expenditures is not encumbered by a big project borrowing today.

In comparison to LeverettNet it should be noted that if you take the 16% of homes in Leverett (about 130) who are responsible to pay the tax increase but are not taking service and multiply the average tax increase of $219 over 20-years – you would get enough funds to cover the $500 installation charge for over 1,100 homes (well over the 811 homes in Leverett). Who are these 16%? Are they rich? Are they poor? Or are they the elderly who either don't want the new technology or are on fixed incomes and cannot afford it? When viewed in this light the Matrix Plan represents not just the most cost efficient way to get broadband but also the most equitable.

MATRIX DESIGN GROUP