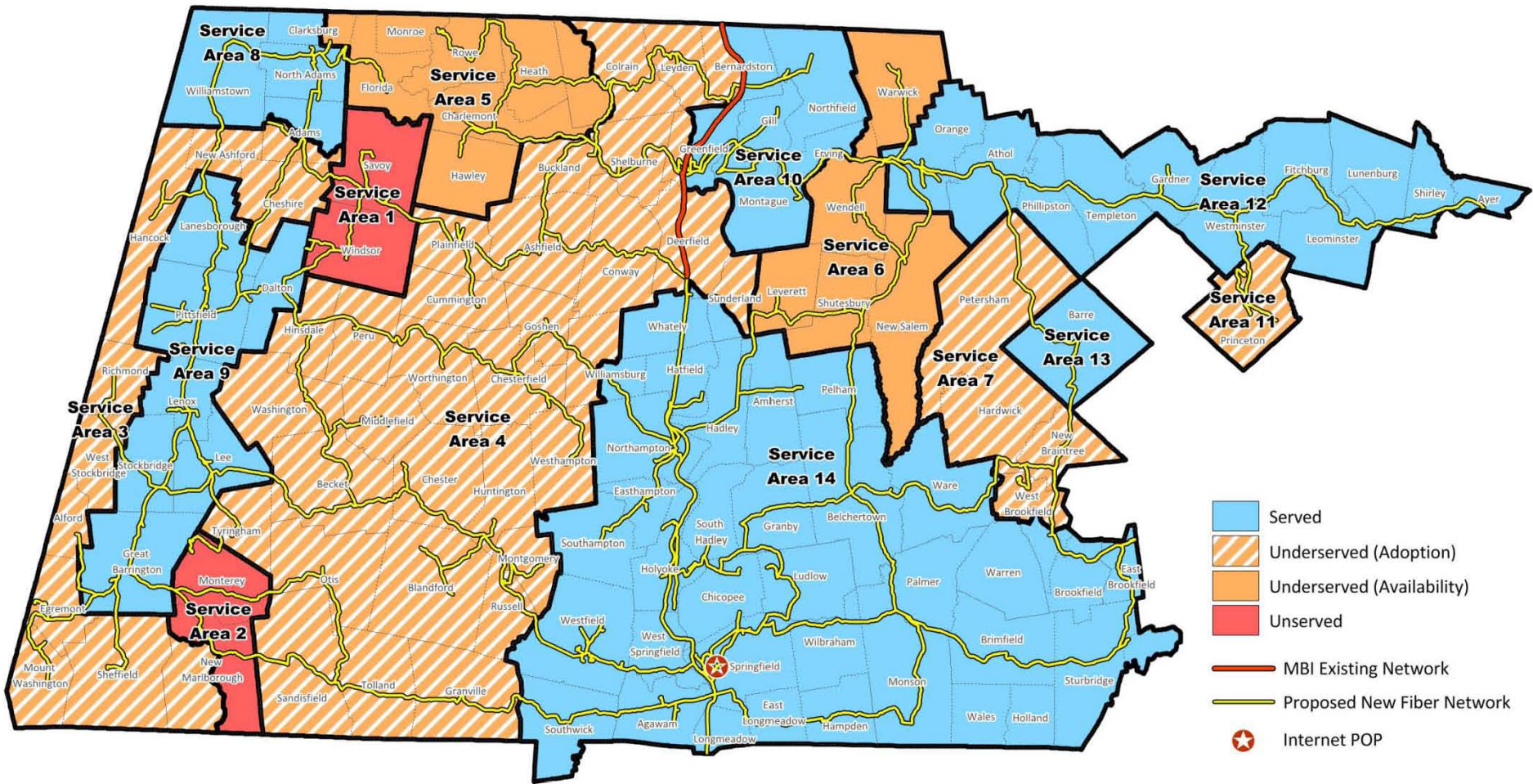
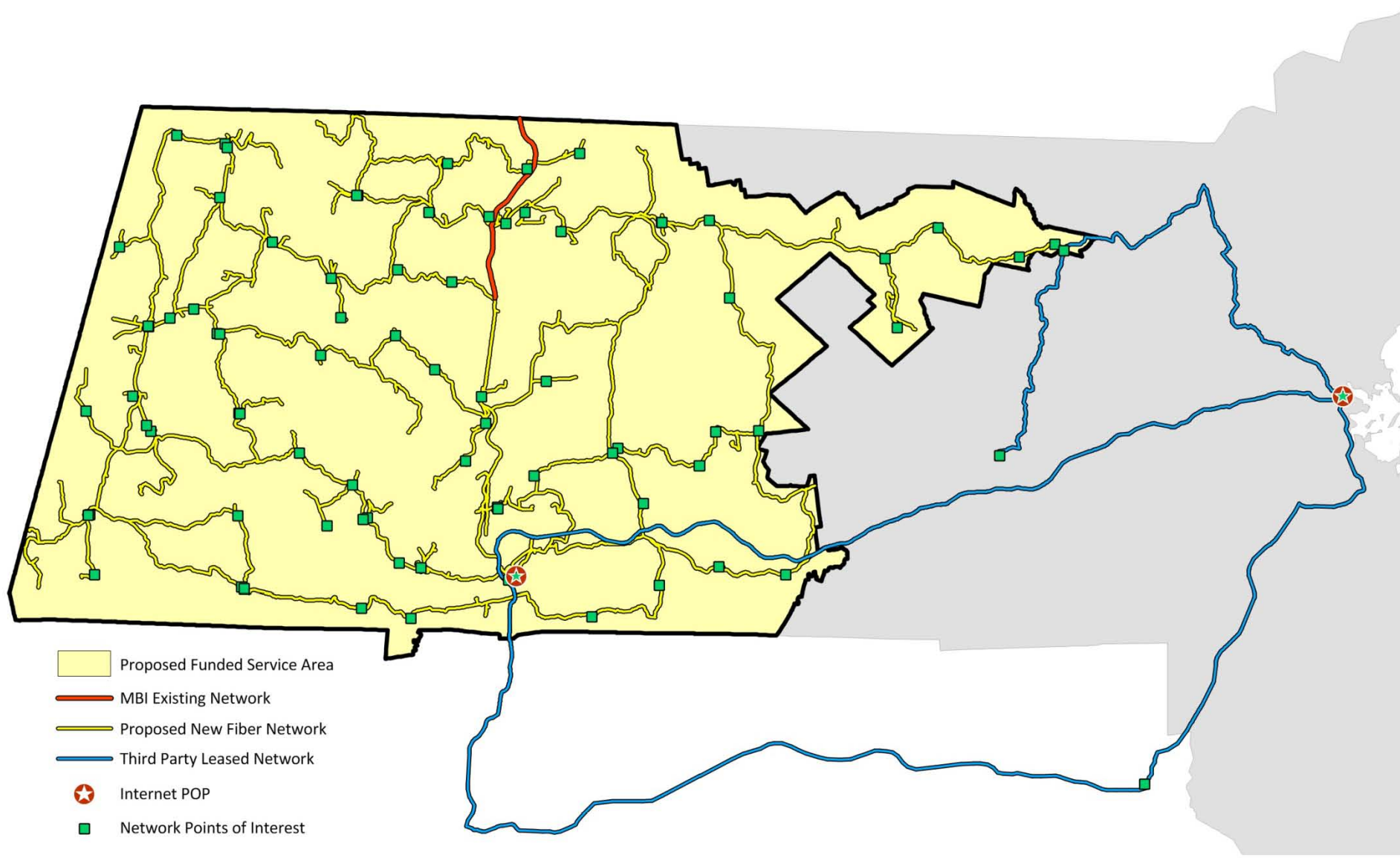


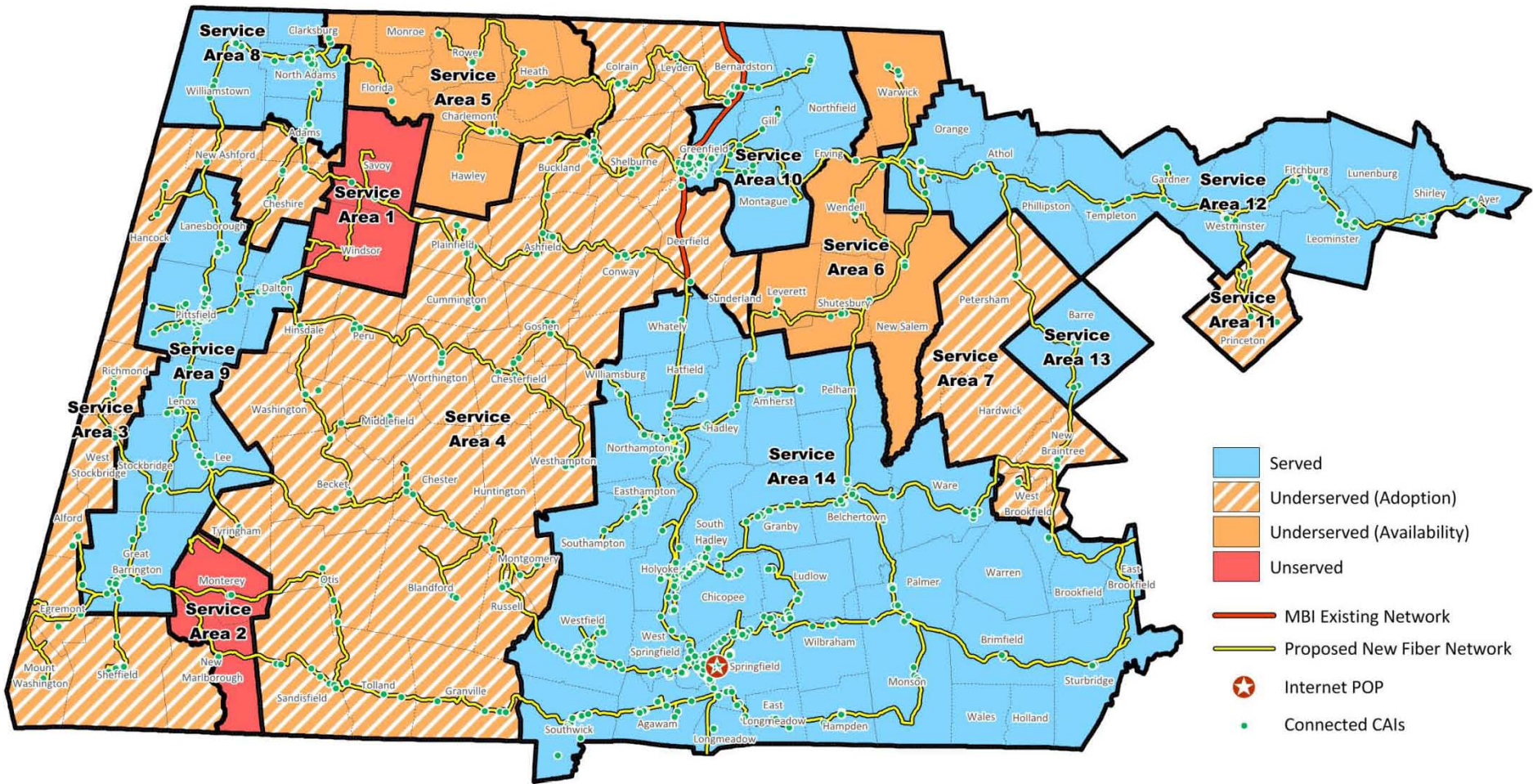
Map A – Individual Service Areas and Proposed Network



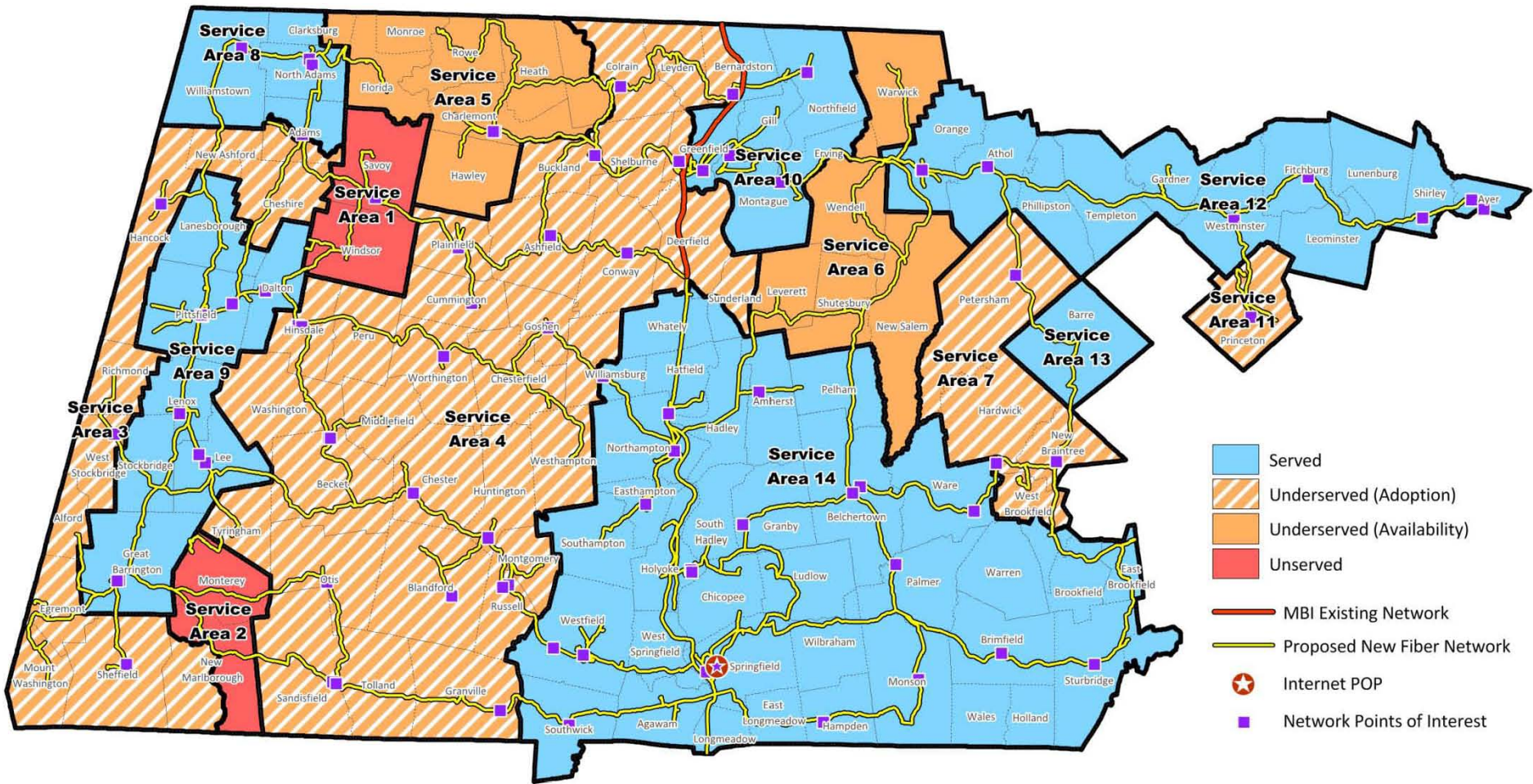
Map B – Proposed Funded Service Area and Complete Network



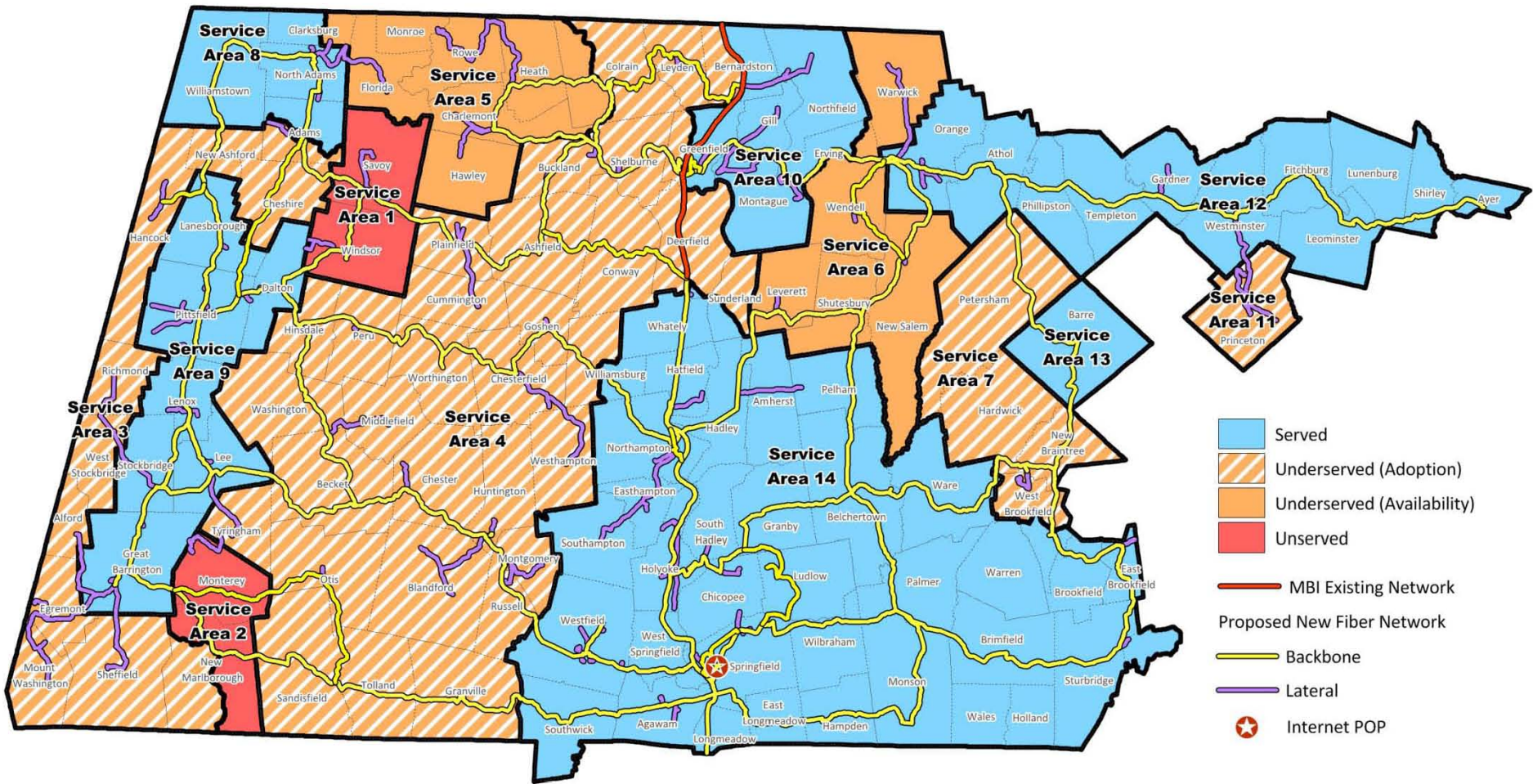
Map C – Service Area and Proposed Network with Connected CAIs



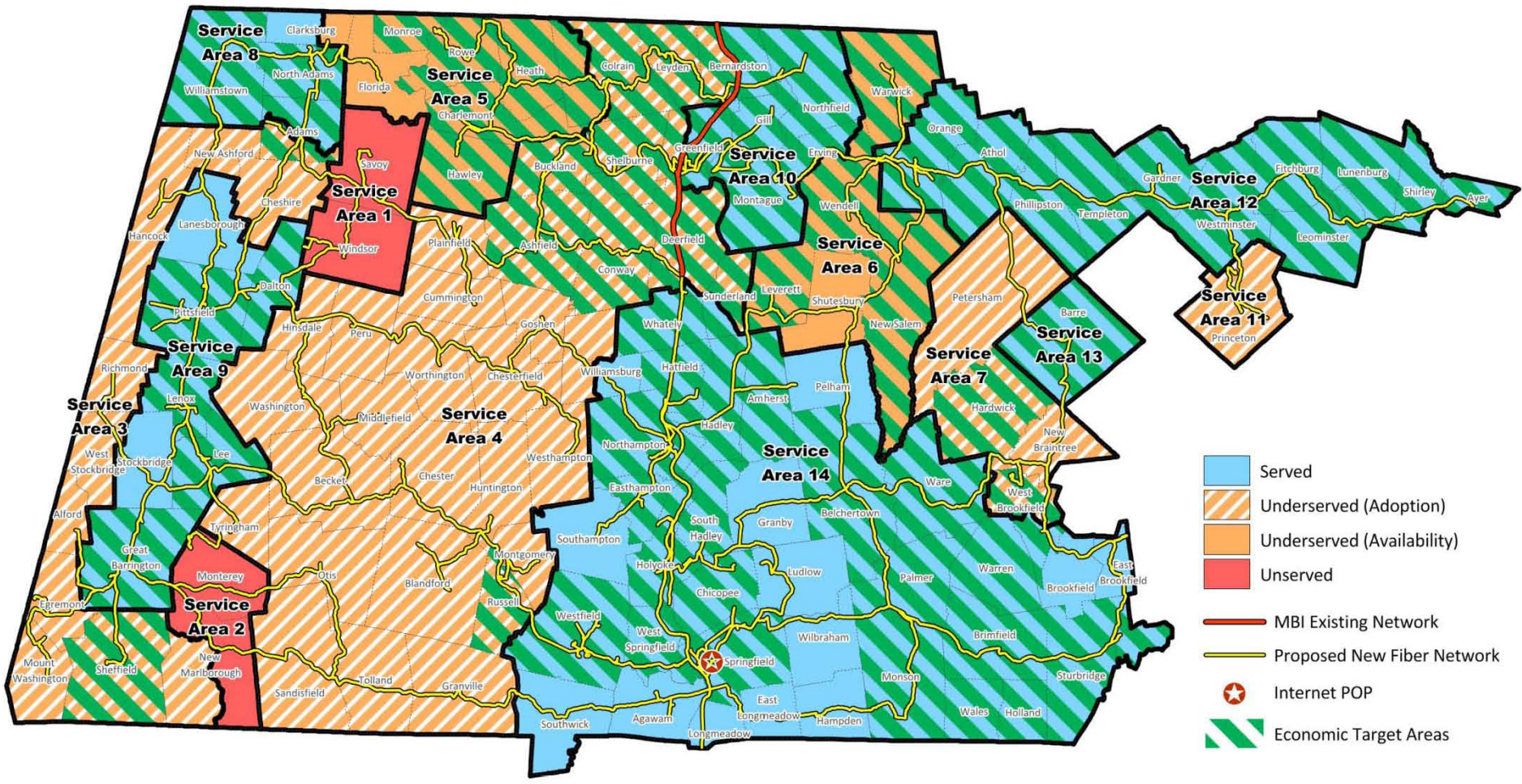
Map D – Service Area and Proposed Network with Active Points of Interest



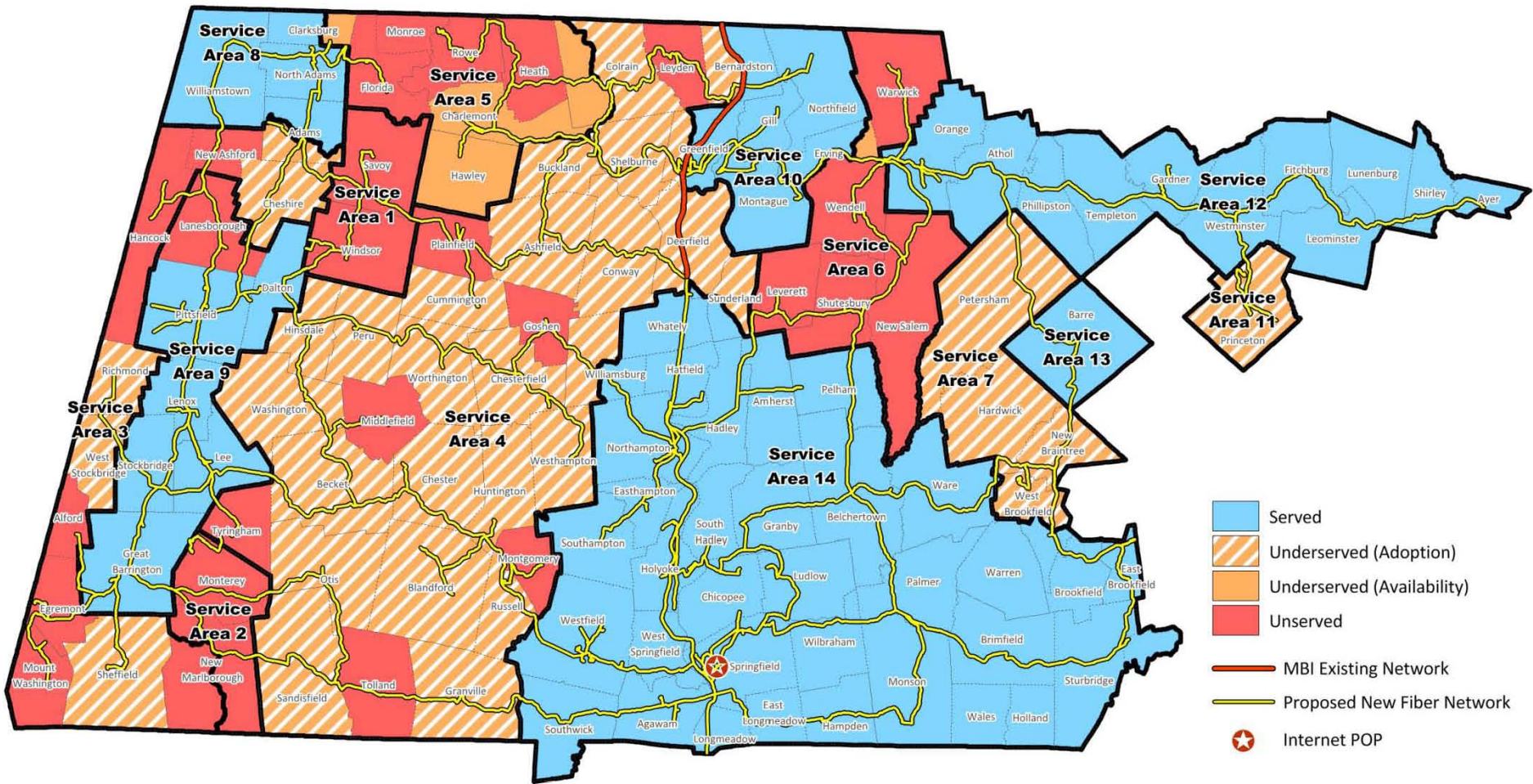
Map E – Service Area and Proposed Network with Laterals / Backbone



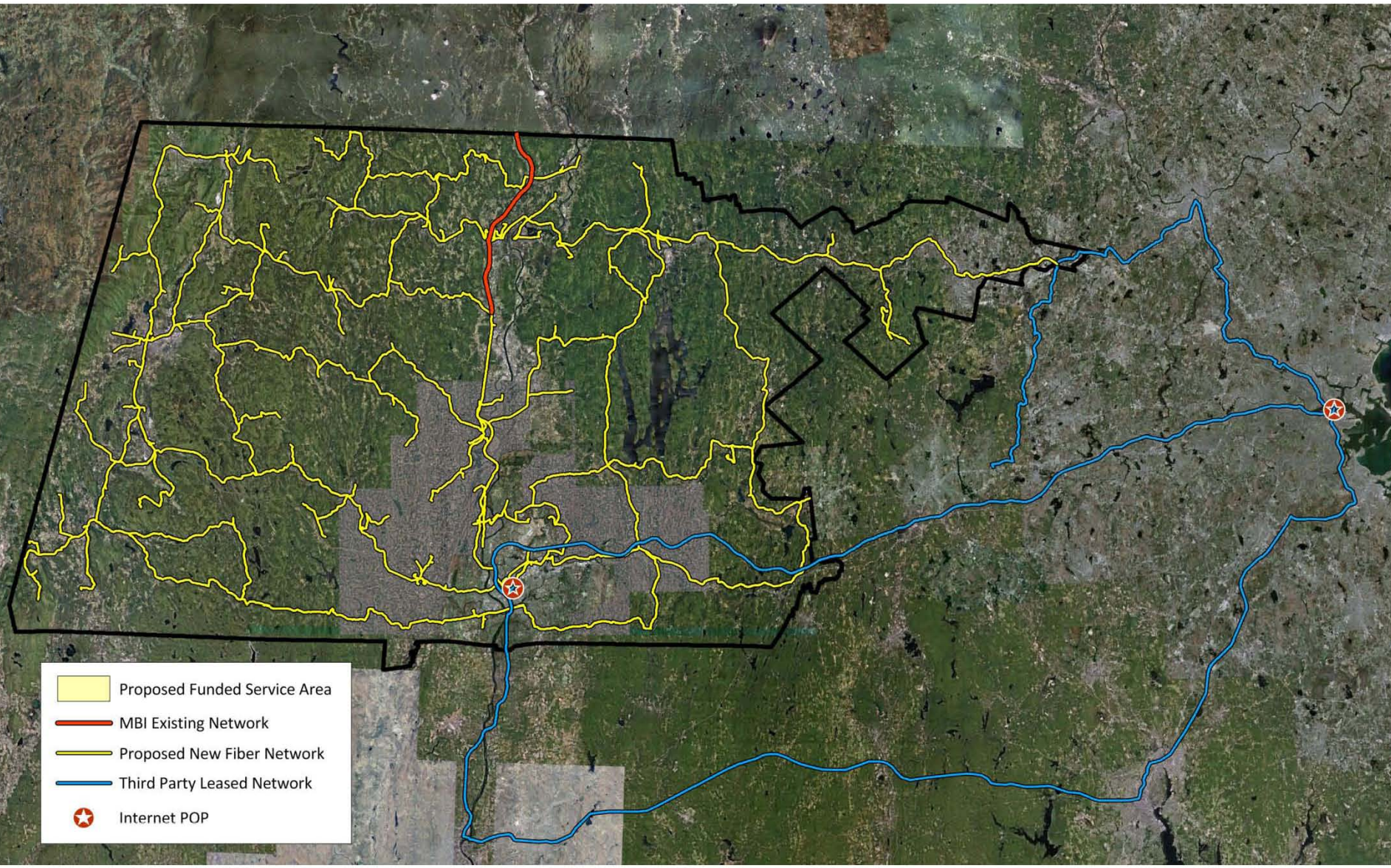
Map G – Service Area and Proposed Network with State Economic Target Areas



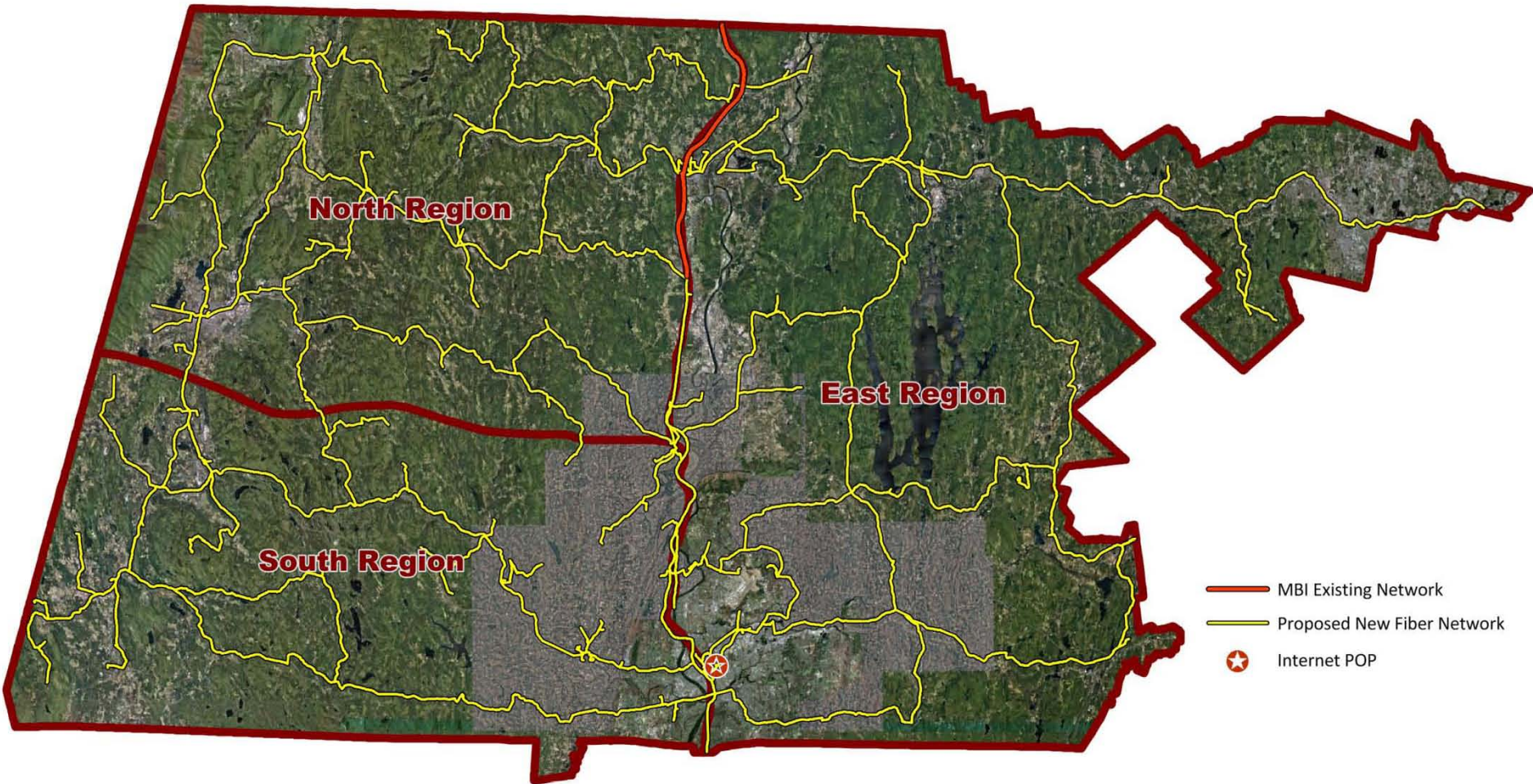
Map H – Un/Underserved Status, Excluding 3G Broadband Coverage



Map I – MassBroadband 123 Network



Map J – MassBroadband 123 Network and Service Area with Buildout Regions



**BTOP Comprehensive Community Infrastructure
Detailed Budget**

Please complete the General Budget Overview and Detailed Project Costs worksheets.

Please refer to the Comprehensive Community Infrastructure Grant Guidance for detailed instructions on the completing this attachment.

Applicants are required to provide this attachment as an Excel file, and not to convert it to PDF when submitting a copy of their application on an appropriate electronic medium, such as a DVD, CD-ROM, or flash drive. Applicants should not alter the layout of the provided templates, except to insert additional line-items as needed in the Detailed Project Costs worksheet.

General Budget Overview

Budget	Federal Funding Request	Matching Funds (Cash)	Matching Funds (In-Kind)
Network & Access Equipment (switching, routing, transport, access)	\$4,462,158	\$2,097,567	\$0
Outside Plant (cables, conduits, ducts, poles, towers, repeaters, etc.)	\$30,814,956	\$16,211,159	\$3,111,353
Buildings and Land (new construction, improvements, renovations, lease)	\$718,594	\$337,796	\$0
Customer Premise Equipment (modems, set-top boxes, inside wiring, etc.)	\$329,971	\$155,112	\$0
Billing and Operational Support Systems (IT systems, software, etc.)	\$0	\$0	\$0
Operating Equipment (vehicles, office equipment, other)	\$0	\$0	\$0
Engineering/Professional Services (engineering design, project management, consulting, etc.)	\$7,153,359	\$3,362,645	\$0
Testing (network elements, IT system elements, etc.)	\$939,802	\$441,782	\$0
Site Preparation	\$0	\$0	\$0
Other	\$1,026,604	\$482,585	\$0
TOTAL BROADBAND SYSTEM:	\$45,445,444	\$23,088,647	\$3,111,353
Cost Share Percentage:	63.43%	32.23%	4.34%

Budget TOTAL	Last Mile Allocation	Middle Mile Allocation	Allocated TOTAL
\$6,559,725		\$6,559,725	\$6,559,725
\$50,137,468		\$50,137,468	\$50,137,468
\$1,056,390		\$1,056,390	\$1,056,390
\$485,083		\$485,083	\$485,083
\$0		\$0	\$0
\$0		\$0	\$0
\$10,516,004		\$10,516,004	\$10,516,004
\$1,381,584		\$1,381,584	\$1,381,584
\$0		\$0	\$0
\$1,509,190		\$1,509,190	\$1,509,190
\$71,645,444	\$0	\$71,645,444	\$71,645,444

DETAIL OF PROJECT COSTS

PLEASE COMPLETE THE TABLE BELOW FOR THE DIFFERENT CATEGORIES OF EQUIPMENT THAT WILL BE REQUIRED FOR COMPLETING THE PROJECT. EACH CATEGORY SHOULD BE BROKEN DOWN TO THE APPROPRIATE LEVEL FOR IDENTIFYING UNIT COST

SERVICE AREA or COMMON NETWORK FACILITIES:		Match (Cash/In-kind)	Cash Match Percentage	Unit Cost	No. of Units	Total Cost	Last Mile Allocation	Middle Mile Allocation	Allocated Total	SF-424C Budget Category	Support of Reasonableness
NETWORK & ACCESS EQUIPMENT						\$6,559,725	\$0	\$6,559,725	\$6,559,725		
Switching	Carrier Ethernet - 10 Gbps and 1 Gbps (Major Centralized Facility Node)	Cash Match	31.98%	\$204,989.41	4	\$819,958		\$819,958	\$819,958	10. Equipment	The MassBroadband 123 fiber optic network is designed to be robust and resilient. With 24 centralized facility nodes for housing equipment, the network is designed to provide services ranging from 50 Mbps Ethernet to 10 Gbps WDM services as well as SONET services at OC-48 data rates.
	Carrier Ethernet - 10 Gbps and 1 Gbps (Local Centralized Facility Node - Large)	Cash Match	31.98%	\$135,805.12	9	\$1,222,246		\$1,222,246	\$1,222,246	10. Equipment	
	Carrier Ethernet - 10 Gbps and 1 Gbps (Local Centralized Facility Node - Small)	Cash Match	31.98%	\$36,317.32	11	\$399,491		\$399,491	\$399,491	10. Equipment	
Routing											Equipment quotes based on the proposed network design were provided by multiple vendors and includes state discounts.
Transport	ROADM - 10 Gbps - 2 Degree	Cash Match	31.98%	\$154,789.54	5	\$773,948		\$773,948	\$773,948	10. Equipment	Quotes include equipment cost, installation, configuring, testing and commissioning.
	ROADM - 10 Gbps - 3 Degree	Cash Match	31.98%	\$258,761.30	3	\$776,284		\$776,284	\$776,284	10. Equipment	
	SONET MSPP OC-48	Cash Match	31.98%	\$56,129.90	7	\$392,909		\$392,909	\$392,909	10. Equipment	MBI is an entity of the Commonwealth of Massachusetts and subject to rigorous competitive procurement processes.
	SONET MSPP OC-48	Cash Match	31.98%	\$56,129.90	17	\$954,208		\$954,208	\$954,208	10. Equipment	
	ROADM - 10 Gbps - 2 Degree to Support UMass MITI IRU	Cash Match	31.98%	\$154,789.54	3	\$464,369		\$464,369	\$464,369	10. Equipment	
	LINE CARD and OPTICS Upgrade to Support NEREN IRU	Cash Match	31.98%	\$52,326.00	2	\$104,652		\$104,652	\$104,652	10. Equipment	
Access	SONET mini MSPP	Cash Match	31.98%	\$15,894.18	41	\$651,661		\$651,661	\$651,661	10. Equipment	
Other											
OUTSIDE PLANT						\$50,137,468	\$0	\$50,137,468	\$50,137,468		
Cables (Includes material, make ready, police details, and installation labor)	288 SM Fiber ADSS	Cash Match	31.98%	\$6.86	1,340,982	\$9,196,480		\$9,196,480	\$9,196,480	9. Construction	The MBI fiber optic cable will be installed primarily on existing utility poles in the public right of way. All cable costs include material, make ready, police escorts (details), and installation labor.
	144 SM Fiber ADSS	Cash Match	31.98%	\$6.06	1,987,725	\$12,049,553		\$12,049,553	\$12,049,553	9. Construction	

	96 SM Fiber ADSS	Cash Match	31.98%	\$5.60	448,163	\$2,510,797		\$2,510,797	\$2,510,797	9. Construction	Unit prices for cable were developed and confirmed through the use of vendor quotes. Unit costs for fiber installation were developed and confirmed by three independent contractors with recent experience constructing aerial cable networks in western Massachusetts.
	48 SM Fiber ADSS	Cash Match	31.98%	\$5.39	1,405,252	\$7,574,542		\$7,574,542	\$7,574,542	9. Construction	Labor was calculated using prevailing wage rates and production rates of 2,000 ft per day per crew. The outside plant design includes 10% slack and slack loops (snow shoes) placed on average every 1/4 mile throughout the service area.
	12 SM Fiber ADSS	Cash Match	31.98%	\$5.06	454,601	\$2,298,297		\$2,298,297	\$2,298,297	9. Construction	
	I-91 Project Infrastructure	Cash Match	100.00%	\$8.93	193,142	\$1,725,691		\$1,725,691	\$1,725,691	9. Construction	Costs to complete the I-91 Fiber Build (36.6 miles of fiber) includes construction costs incurred after the release of the NOFA for BTOP Round 2.
	I-91 Project Infrastructure	In-kind Match		\$3,111,353	1	\$3,111,353		\$3,111,353	\$3,111,353	9. Construction	Actual costs to begin the I-91 Fiber Build (18.9 miles of fiber) incurred prior to the release of the NOFA for BTOP Round 2. Initial build includes conduit, handholes, etc.
Conduits (Includes material, make ready, police details, and installation labor)	1.5" FRE or HDPE Direct Burial	Cash Match	31.98%	\$20.40	40,508	\$826,370		\$826,370	\$826,370	9. Construction	Field surveys determined some locations where it is necessary to place the MBI cable underground. The majority of underground cable placement is in existing conduit between the POP at One Federal Street, Springfield, MA and I-91 to the west. Additional cable in conduit is required for bridge attachments and to get between the pole line and the CAI building entrances. This has been kept to a minimum and confirmed during the field survey.
	4" RGS / RMC with 2 - 1.5" HDPE Inner Duct	Cash Match	31.98%	\$33.00	3,485	\$114,990		\$114,990	\$114,990	9. Construction	Bridge attachments, field verified.
	HDD (4" with inner duct pull back)										Horizontal direction drill for crossings as needed. Included in cable installation cost above

	Existing Conduit Break Outs	Cash Match	31.98%	\$2,000.00	50	\$100,000		\$100,000	\$100,000	9. Construction	Required for transitions between aerial and underground installations. Number of transitions is based on field survey. Unit price is based on similar builds in western Massachusetts
Ducts											
Poles (Includes material, pole details, and installation labor)	New 35' Pole (CL 5-35)	Cash Match	31.98%	\$2,110.00	315	\$664,650		\$664,650	\$664,650	9. Construction	The field survey confirmed locations where existing poles are not available. These are new, class 5, 35 foot poles spaced at 142 ft. Material and labor unit costs were validated by local contractors.
	Cable attachment hardware and snow shoes for slack coils	Cash Match	31.98%	\$90.00	35,058	\$3,155,190		\$3,155,190	\$3,155,190	9. Construction	Material quote. Snow shoe spacing averages 1/4 mi across the entire network. Spacing will be closer as CAI, business and resident density increases.
Towers											None required
Repeaters											None required
Other	Splice Case	Cash Match	31.98%	\$430	1,404	\$603,720		\$603,720	\$603,720	9. Construction	Assumes 17,000 ft cable spools plus additional splice cases for drops to CAIs. Quotes received
	Butt Splices	Cash Match	31.98%	\$20	50,940	\$1,018,800		\$1,018,800	\$1,018,800	9. Construction	Quoted rate is \$20 per splice which includes set-up costs of \$250 per splice. All strands are spliced.
	Terminations (Fiber Strands)	Cash Match	31.98%	\$15	25,840	\$387,600		\$387,600	\$387,600	9. Construction	Quoted rate is \$15 per termination
	Fiber Termination Panels	Cash Match	31.98%	\$2,250	46	\$103,500		\$103,500	\$103,500	9. Construction	Material quote
	Handholes, manholes and junction boxes	Cash Match	31.98%	\$2,100	150	\$315,000		\$315,000	\$315,000	9. Construction	Located at breakouts, transitions, CAI Nodes, cabinets. Quoted material price.
	CAI Splices	Cash Match	31.98%	\$20	12,768	\$255,360		\$255,360	\$255,360	9. Construction	1064 drops (12 strand cable) to 1392 CAIs. Splice quote received.
	NEREN 15 Year IRU	Cash Match	31.98%	\$1,350,000	1	\$1,350,000		\$1,350,000	\$1,350,000	9. Construction	Quote from NEREN.
UMass MITI 19 Year IRU	Cash Match	31.98%	\$2,775,575	1	\$2,775,575		\$2,775,575	\$2,775,575	9. Construction	Fair market value estimate based on costs provided by UMass MITI.	

SERVICE AREA or COMMON NETWORK FACILITIES:			Unit Cost	No. of Units	Total Cost	Last Mile Allocation	Middle Mile Allocation	Allocated Total	SF-424C Budget Category	Support of Reasonableness	
OPERATING EQUIPMENT					\$0	\$0	\$0	\$0			
Vehicles											
Office Equipment / Furniture											
Other											
PROFESSIONAL SERVICES					\$10,516,004	\$10,516,004	\$10,516,004				
Engineering Design	Network Design									Work includes development of specifications for procurement documents, development of IP addressing schema and completion of network details coordinated with the RTNO.	
	Detailed Engineering	Cash Match	31.98%	\$126	1,136	\$142,836	\$142,836	\$142,836	4. Architectural and engr.		
	As built (by Design Build Contractor)										Staffing plan and labor rates provided in Budget Narrative
	Outside Plant Engineering (OSP)										Based on 200:1 scale plans for cable running line and two running lines per sheet. 730 base plans are estimated. 2 hrs CAD time per sheet
	Base Plan Development	Cash Match	31.98%	\$99.34	1580	\$156,960	\$156,960	\$156,960	4. Architectural and engr.		
	Permitting and Licensing	Cash Match	31.98%	\$125.08	6,560	\$820,552	\$820,552	\$820,552	4. Architectural and engr.	Work includes environmental permitting; right of way acquisition for new pole lines, and pole licensing. 2.3 FTE for 18 months	
	Survey and field research	Cash Match	31.98%	\$113.95	4,920	\$560,640	\$560,640	\$560,640	4. Architectural and engr.	Work includes inventory of pole numbers; survey for placement transitions from aerial to underground, aerial to bridge attachment; entry to the major and local facility nodes; development of new pole line; geospatial data collection; environmental data collection and other field data collection efforts. 2.3 FTE over 1 year.	
	Detailed Engineering	Cash Match	31.98%	\$113.82	7,200	\$819,480	\$819,480	\$819,480	4. Architectural and engr.	3.75 FTE full time over 12 months to complete and issue plans and develop specifications for design build procurement.	
	As built										As-Built drawings will be prepared by Design Build Contractor and included in OSP costs
	Building (Inside Plant Design)										Staffing plan and labor rates provided in Budget Narrative
	Base Plan Development	Cash Match	31.98%	\$100.90	704	\$71,032	\$71,032	\$71,032	4. Architectural and engr.	Based on 24 sites, 4 sheets per site, 5 hrs per sheet plus quality check	
	Survey	Cash Match	31.98%	\$101.53	592	\$60,104	\$60,104	\$60,104	4. Architectural and engr.	Based on 24 sites, 2 men, 8 hrs ea site plus site stake-out for cable entry and cabinet placement	
	Site Acquisition	Cash Match	31.98%	\$123.50	80	\$9,880	\$9,880	\$9,880	4. Architectural and engr.	Agreement development for placing equipment cabinets using detailed engineering plans	
	Permitting	Cash Match	31.98%	\$139.50	504	\$70,308	\$70,308	\$70,308	4. Architectural and engr.	Based on 16 hrs ea for 22 locations. Includes 2 public hearings. Permit plans use the detailed engineering plans.	
	Detailed Engineering	Cash Match	31.98%	\$115.47	1,868	\$215,700	\$215,700	\$215,700	4. Architectural and engr.	Issue plans and specification as design build.	
As built										As-Built drawings will be prepared by Design Build Contractor and included in OSP costs	

SERVICE AREA or COMMON NETWORK FACILITIES:			Unit Cost	No. of Units	Total Cost	Last Mile Allocation	Middle Mile Allocation	Allocated Total	SF-424C Budget Category	Support of Reasonableness
OTHER UPFRONT COSTS					\$1,509,190	\$0	\$1,509,190	\$1,509,190		
Site Preparation										None required
Other	Director MBI/Construction Oversight; Construction Project Manager; MBI Deputy Director; Compliance Staff	Cash Match	31.98%	\$124.43	884	\$109,992	\$109,992	\$109,992	1. Admin and Legal	Employee cost for approximately 2 FTE's during the period from the NOFA announcement through application submission, including blended actual salary costs, benefit rate of 35.23%, and an indirect cost rate of 76.02%, the rate that has been accepted for us
	Professional and Consulting Services	Cash Match	31.98%	\$250.00	2,531	\$632,780	\$632,780	\$632,780	1. Admin and Legal	Costs include consulting fees for application preparation support, engineering, environmental and procurement assistance incurred or planned for the period from the NOFA announcement until the application submission. Cost represents estimated 2531 hours
	Office Facility Charge	Cash Match	31.98%	\$0.13	1,061,497	\$137,995	\$137,995	\$137,995	1. Admin and Legal	Office Facility Rent charge is cost for office space, utilities, and other related costs for staff and is based upon direct salary dollars of the staff attributable to the project. The direct fee is charged at \$.13 per salary dollar charged to a project.
	Compliance Staff	Cash Match	31.98%	\$117.90	5,330	\$628,424	\$628,424	\$628,424	1. Admin and Legal	Compliance Staff assumes a total of 1 FTE in YR 1 and .75 FTE in Yrs 2 & 3 to manage all legal, federal and state compliance, and compliance with all construction and procurement matters. Costs include a salary \$97,500, benefit rate of 35.23%, and indirect cost rate of 76.02%. Assumptions includes a 3% cost of living adjustment per year. The activities includes participation in all legal, financial and general compliance requirements for federal, state, and internal policies.
PROJECT TOTAL:					\$71,645,444	\$0	\$71,645,444	\$71,645,444		

Key Phases and Milestones			
Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 0	Complete I-91 fiber construction	Construction is already underway and a firm completion date for fiber deployment, splicing, and testing is available from the contractor. All work will be completed by summer 2010. This milestone is important because it completes a core segment of the network backbone.	Completed as-built drawings and project closeout
Year 0	Finalize agreement with Project Management/Construction Management team	MBI has consultants under contract for its I91 and grant preparation work, plus consultants on retainer. This, plus MTC and state procurement expertise, provide all the skills needed to issue an RFP for a PM/CM and evaluate responses. MBI has also met with a number of area contractors is well aware of availability and capability. This activity will take ~4 months, plus ~1 month for contract negotiations, and begins immediately upon grant submission. This milestone is important because the PM/CM hiring is a pre-requisite to construction.	Signed Contract
Year 0	Finalize agreement with Network Operator	MBI has completed extensive preliminary steps in engaging a network operator including: (a) holding an industry outreach meeting in 7/2009, (b) conducting meetings with potential network operators, and (c) releasing a network operator RFI to inform an RFP. After evaluation of RFI responses, MBI will prepare and issue an RFP which will take ~4 months plus ~1 month for contract negotiations, and will begin immediately on grant submission. This milestone is important because the Network Operator will influence final network design and be a key party to negotiation with node-location owners. Early signing of the network operator also allows pre-sales to begin to ensure rapid adoption of the network.	Signed Contract
Year 0	Finalize lease agreement for colocation space at One Federal Street (Point of Presence)	MBI has already met with the facility board of directors and management company and confirmed that colocation space is available. Contract negotiations will take about ~1 month and will be completed prior to grant award.	Signed Contract
Year 0	Execute pole attachment agreements with Verizon, National Grid and Western Mass Electric, and conduit agreements	MBI has held preliminary discussions with all three major utility companies in the region and has been provided with letters of support for the project. Negotiations for agreement will begin after grant submission and are expected to take 2~4 months to complete.	Signed Agreements
Year 1 Qtr. 1	Establish project design and specification standards and contractor forms	Commencing immediately after the PM/CM under contract, project design standards, finalized specification standards, and other project management documents. These standards are essential to execution and control of the project.	Project standards established

Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 1 Qtr. 1	Start Network Design & Prepare & submit pole attachment applications for Eastern Region	The first area to be designed will be the Eastern Region. Work on that design will commence upon hiring of the PM/CM. Upon completion of negotiations with applicable pole owners, MBI will submit pole attachment applications for the Eastern Region, at least in part, to facilitate early connection of certain higher priority locations. MBI will begin this process with its existing contractor, while completion will depend on hiring of the PM/CM.	Pole attachment applications
Year 1 Qtr. 2	Make ready construction begins	The PM/CM will conduct preparatory activities so that joint make-ready surveys can begin no later than Y1Q1. This process takes 45 days from application to availability of make ready estimates. MBI/MTC will promptly pay make-ready estimates to minimize delays. Fiber deployment can not begin on a route until make ready has been completed.	Work orders are issued by utility companies for pole rearrangements
Year 1 Qtr. 2	Environmental permitting completed	Environmental maps have already been prepared as a part of this application process. The maps and associated information will help the PM/CM firm in executing all environmental studies and permits. The project is almost exclusively based on existing rights-of-way and aerial deployment, so environmental impacts are minimal. Where impact may occur, mitigation plans or network rerouting will be defined so that minimal environmental impact occurs. Environmental permits are a pre-requisite for fiber deployment.	Permits are received by MBI
Year 1 Qtr. 2	Complete network design and engineering in the Southern Region & Northern Region	The network will be built in separate regions. For policy and priority reasons the construction will be started on the Eastern Ring first. The network design and engineering will be undertaken by a staff of at least 14 FTEs from the PM/CM team and Network Operator. Subject matter experts will be brought to tasks as required. Completed design and engineering are prerequisites for permitting and make ready in the region.	Drawing package and design specifications are "issued for construction"
Year 1 Qtr. 3	Prepare & submit pole attachment applications for Southern and Northern Regions	Upon completion of design and engineering, MBI will submit pole attachment applications for the Southern and Northern Regions. This is the pre-requisite step for make ready for Southern and Northern regions. Pole owners will provide make ready estimates as noted above in 45 days from the application. Pole attachment agreements are staggered between rings to enable pole owners to more easily meet their 180 day deadlines.	Application packages are finished and submitted
Year 1 Qtr. 3	Contract with construction contractor	MBI will procure one or more construction contractors through a public procurement process for construction. The procurement process will begin after the PM/CM are hired, and must be completed by Y1Q3. The procurement and contracting process will take ~ 6 months and must be completed at least 1 month prior to construction beginning. MBI has confirmed availability of interested contractors.	Contract signed

Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 1 Qtr. 3	Cabinet design and siting agreements	MBI has conducted extensive outreach with municipalities and public safety regarding locations for network equipment nodes. All entities have indicated interest in assisting in this process. MBI and contractors will confirm site locations, and finalize designs and agreements for inside equipment facilities and outside cabinets which are planned for 22 locations. This is a prerequisite for equipment deployment but does not need to be completed prior to submitting permits due to having multiple options available for locations.	Drawings and specifications submitted and agreements are executed
Year 1 Qtr. 3	Complete One Federal Street build-out	One Federal Street is the networks primary interconnection point with the Internet. Its completion is required prior to the first network users going live, but other activities are not dependent on it. Due to the completed deployment of 191 fiber, and potential for limited early use of some network segments, this build-out will be completed early in the plan, and can be moved earlier in the schedule should that be necessary. The fit-out of the room should take under 2 months from completion of the contract.	Cages and equipment are in place and ready for use
Year 1 Qtr. 3	Complete network design and engineering in the Eastern Region	The full network design for the Eastern Region will be completed by this point. This is a pre-requisite for construction, and depends on finalization of all network routes. To ensure timely completion of network design, 14 FTE are allocated to this effort across the three regions.	Eastern region drawing and specification package is issued for construction
Year 1 Qtr. 4	Execute IRUs	MBI intends to obtain two IRUs to connect western Massachusetts with key locations in Eastern Mass, one from NEREN and a second from UMass MITI. Both IRUs will be obtained as long term, and are required before the network is fully operational. Other than full operation, there are no dependencies on them. MBI will execute the IRU agreements 6 months prior to the completion of network construction. If some users come onto the network early and require transport to eastern MA, then MBI may execute one of the IRU agreements earlier than this quarter. Equipment for lighting/upgrading the IRUs will not be purchased until after the IRU contracts are completed.	Signed IRUs
Year 1 Qtr. 4	Procure fiber optic cable and OSP equipment/hardware	MBI will procure the fiber optic cable and equipment and have it drop shipped to the contractor's yard. The procurement process itself will take about 3 months, and vendors indicate that they typically ship fiber of these quantities within 2 weeks. MBI will confirm availability and place fiber orders sufficiently in advance to ensure timely arrival.	Cable and equipment is staged in contractor's yard and warehouse.

Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 1 Qtr. 4	Complete network design and engineering in the Northern Region	The full network design for the Northern Region will be completed by this point. This is a pre-requisite for construction, and depends on finalization of all network routes. To ensure timely completion of network design, 14 FTE are allocated to this effort across the three regions.	Northern region drawing and specification package is issued for construction
Year 2 Qtr. 1	Make ready construction is completed in the Eastern and Southern Regions	MBI will receive notification from pole owners that make ready is completed. Make ready completion is a pre-requisite to construction. Make ready completion does not happen all at once, it will be a rolling process, with MBI receiving notification on portions of each region as they complete. Y2Q1 completion of make ready matches the 180 period that the pole owners are allowed.	Written permission is received from utility companies to attach to the poles in Eastern and Southern Regions
Year 2 Qtr. 1	OSP fiber construction begins in the Eastern and Southern Region	As make ready is completed, construction can begin. The number of construction crews deployed will vary depending on the amount of make ready which is completed and status against construction schedule. Productivity can be measured through daily work reports and red-line as-builts which will be received from field construction inspectors who approve completed work.	Construction crews are deployed.
Year 2 Qtr. 2	Make ready construction is completed in the Northern Region	MBI will receive notification from pole owners that make ready is completed. Make ready completion is a pre-requisite to construction. Make ready completion does not happen all at once, it will be a rolling process, with MBI receiving notification on portions of each region as they complete. Y2Q2 completion of make ready accomodates the 180 period that the pole owners are allowed.	Written permission is received from utility companies to attach to the poles in Northern Region.
Year 2 Qtr. 2	OSP fiber construction begins in the Northern Region	As make ready is completed, construction can begin. The number of construction crews deployed will vary depending on the amount of make ready which is completed and status against construction schedule. Productivity can be measured through daily work reports and red-line as-builts which will be received from field construction inspectors who approve completed work.	Construction crews are deployed.
Year 2 Qtr. 2	Receive/stage electronic equipment	MBI will use an open and competitive procurement process to obtain electronics to light the fiber network and support connected CAIs. This milestone is placed at near its latest date to ensure that the equipment warranties are not wasted. The procurement process will require ~4 months, and vendors will be provided with ample lead time to plan for the equipment shipment (and installation).	Electronic equipment is staged in contractor's yard and warehouse.

Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 2 Qtr. 3	OSP fiber construction is completed in the Southern and Eastern Regions	Fiber construction in the region(s) is completed with all fiber deployed on poles and in conduit, and run to all CAIs to be directly connected during the project. Completion of this milestone means the network is ready for splicing.	Asbuilts are filed and reconciliation of construction activities are completed for the Southern and Eastern Regions
Year 2 Qtr. 3	Begin CAI connections and equipment installation	Prior to connecting CAIs, exterior and interior site surveys will be completed and equipment manifests prepared for each location. This activity represents the start of actual inside plant deployment to CAIs.	First CAI deployment completed
Year 2 Qtr. 3	67% of network construction completion	NTIA BTOP Milestone for 67% complete within 2 years.	2/3 of milestones complete 2/3 of money expended
Year 2 Qtr. 3	Configure network operator billing and support systems	Network Operator configures their billing and customer support systems for MassBroadband 123	Completed system test results
Year 2 Qtr. 3	Fiber splicing and testing and equipment installation complete in Southern Region	Completion of all splicing in completed region(s) and deployment of optical equipment including successful execution and documentation of end-to-end tests of network integrity and signaling losses within specification. This is dependent on construction completion and is a prerequisite for network operation for a region.	Electronically formatted test data for cable and electronics is received from the technicians. Equipment as-builts are received.
Year 2 Qtr. 3	Initial network operations begin in the Southern Region	Network region becomes operational after completion of construction, testing, and deployment of all equipment.	Proof of acceptance tests completed First customer goes live
Year 2 Qtr. 4	OSP fiber construction is completed in the Eastern Regions	Fiber construction in the region(s) is completed with all fiber deployed on poles and in conduit, and run to all CAIs to be directly connected during the project. Completion of this milestone means the network is ready for splicing.	Asbuilts are filed and reconciliation of construction activities are completed for the Southern and Eastern Regions

Quarter	Milestones	Support for Reasonableness	Evidence of Completion
Year 2 Qtr. 4	Fiber splicing and testing and equipment installation complete in the Eastern and Northern Regions	Completion of all splicing in completed region(s) and deployment of optical equipment including successful execution and documentation of end-to-end tests of network integrity and signaling losses within specification. This is dependent on construction completion and is a pre-requisite for network operation for a region.	Electronically formatted test data for cable and electronics is received from the technicians. Equipment as-builts are received.
Year 2 Qtr. 4	Network testing and acceptance complete	Network region becomes operational after completion of construction, testing, and deployment of all equipment.	Proof of acceptance tests completed First customer goes live
Year 2 Qtr. 4	Network Construction Complete	All outside plant work for all regions is completed.	Construction crews demobilize.
Year 3 Qtr. 1	100% of OSP construction completion		100% of construction milestones complete
Year 3 Qtr. 2	CAI connections completed	Inside plant work at remaining CAI's completes as part of grant project.	Last CAI Connected
	Post Construction Activities		
Year 3 Qtr. 2	Decommission all construction related activities	Once construction has been completed, construction crews can be demobilized, final as-builts assembled, and routine end-of-construction tasks begun to wrap up the project.	Construction crews demobilized
Year 3 Qtr. 3	Complete final annual Audit		Audit report
	Grant Activities 100% Complete	NTIA BTOP Milestone for 100% project completion within 3 years.	100% of grant funds expended

ID	Task Name	Duration	2011				2012				2013				
			Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
1	Engineering and Design	190 days			0%										
2	East Region - Engineering/Design	130 days			0%										
3	South Region - Engineering/Design	79 days			0%										
4	North Region - Engineering/Design	105 days			0%										
5	Pole Attachment License Applications	200 days			0%										
6	East Region - License Applications	132 days			0%										
7	South Region - License Applications	114 days			0%										
8	North Region - License Applications	135 days			0%										
9	Make Ready Surveys and Rearrangements	250 days			0%										
10	East Region - Make Ready	175 days			0%										
11	South Region - Make Ready	180 days			0%										
12	North Region - Make Ready	185 days			0%										
13	Fiber Optic Network Construction	350 days			0%										
14	Build-out 1 Federal Street Facility - OSP&ISP	20 days			0%										
15	East Region - Fiber Optic Network Construction	195 days			0%										
16	South Region - Fiber Optic Network Construction	110 days			0%										
17	North Region - Fiber Optic Network Construction	125 days			0%										
18	Fiber Optic Splicing and Acceptance Testing	121 days			0%										
19	East Region - Fiber Splicing and Acceptance Testing	56 days			0%										
20	South Region - Fiber Splicing and Acceptance Testing	30 days			0%										
21	North Region - Fiber Splicing and Acceptance Testing	20 days			0%										
22	67% Construction Completion	0 days													
23	Completion of Network Construction	0 days													

Project: MBI Gantt Chart 032410 v.5
Date: Thu 3/25/10

Task: Progress: Milestone: Summary: External Tasks: External Milestone: Deadline:

18.3 Build-Out Time Line Part 2 - Total Proposed Funded Service Area

TOTAL AREA														
MassBroadband 123														
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$813,604	\$469,150	\$5,530,783	\$6,674,383	\$8,486,016	\$9,441,811	\$11,440,573	\$13,836,156	\$9,830,437	\$3,555,848	\$695,561	\$400,640	\$470,480	\$71,645,444.0
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	212,000	76,879	99,526	-	-	-	-	388,405
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.6%	19.8%	25.6%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	23,629	8,654	12,023	-	-	-	-	44,306
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	53.3%	19.5%	27.1%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	1,189	439	492	-	-	-	-	2,121
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	56.1%	20.7%	23.2%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 1

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$20,006	\$11,536	\$135,997	\$164,117	\$208,664	\$232,166	\$281,314	\$340,219	\$241,722	\$87,435	\$17,103	\$9,851	\$11,569	\$1,761,698.0
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	-	613	-	-	-	-	-	613
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	-	72	-	-	-	-	-	72
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	-	11	-	-	-	-	-	11
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 2

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$16,394	\$9,453	\$111,442	\$134,485	\$170,988	\$190,247	\$230,521	\$278,790	\$198,078	\$71,648	\$14,015	\$8,073	\$9,480	\$1,443,613.6
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	-	-	627	-	-	-	-	627
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	-	-	264	-	-	-	-	264
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	-	-	9	-	-	-	-	9
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 3

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$43,659	\$25,175	\$296,785	\$358,152	\$455,365	\$506,653	\$613,908	\$742,457	\$527,507	\$190,809	\$37,324	\$21,499	\$25,246	\$3,844,538.8
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	4,095	1,433	896	-	-	-	-	6,424
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.8%	22.3%	13.9%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	957	404	783	-	-	-	-	2,145
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	44.6%	18.8%	36.5%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	39	11	10	-	-	-	-	60
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	64.9%	18.9%	16.2%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 4

TOTAL AREA														MassBroadband 123													
	Year 0	Year 1				Year 2				Year 3				Total													
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4														
Infrastructure Funds																											
Infrastructure Funds Advanced (estimate)	\$191,340	\$110,333	\$1,300,708	\$1,569,655	\$1,995,708	\$2,220,488	\$2,690,549	\$3,253,933	\$2,311,884	\$836,250	\$163,579	\$94,221	\$110,646	\$16,849,295.4													
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%													
Entities Passed & %																											
Households	-	-	-	-	-	-	13,544	1,158	2,204	-	-	-	-	16,907													
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.1%	6.9%	13.0%	0.0%	0.0%	0.0%	0.0%	100%													
Businesses	-	-	-	-	-	-	2,343	348	997	-	-	-	-	3,689													
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	63.5%	9.4%	27.0%	0.0%	0.0%	0.0%	0.0%	100%													
Strategic Institutions	-	-	-	-	-	-	184	29	49	-	-	-	-	262													
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	70.0%	11.1%	18.8%	0.0%	0.0%	0.0%	0.0%	100%													

18.3 Build-Out Time Line Part 2 - Service Area 5

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$38,648	\$22,286	\$262,727	\$317,051	\$403,108	\$448,511	\$543,458	\$657,254	\$466,972	\$168,912	\$33,041	\$19,031	\$22,349	\$3,403,349.7
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	1,827	150	-	-	-	-	-	1,977
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	92.4%	7.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	439	55	-	-	-	-	-	494
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	88.8%	11.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	43	2	-	-	-	-	-	45
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	94.6%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 6

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$36,443	\$21,014	\$247,734	\$298,958	\$380,105	\$422,917	\$512,445	\$619,748	\$440,324	\$159,273	\$31,155	\$17,945	\$21,074	\$3,209,134.7
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	1,751	649	-	-	-	-	-	2,400
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	73.0%	27.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	312	123	-	-	-	-	-	435
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	71.7%	28.3%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	34	6	-	-	-	-	-	40
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	84.4%	15.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 7

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$21,690	\$12,507	\$147,448	\$177,936	\$226,233	\$251,714	\$305,001	\$368,866	\$262,075	\$94,797	\$18,543	\$10,681	\$12,543	\$1,910,035.4
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	1,606	-	536	-	-	-	-	2,142
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	0.0%	25.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	281	-	141	-	-	-	-	422
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	66.5%	0.0%	33.5%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	8	-	7	-	-	-	-	15
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	54.5%	0.0%	45.5%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 8

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$23,080	\$13,308	\$156,892	\$189,333	\$240,724	\$267,837	\$324,536	\$392,492	\$278,861	\$100,869	\$19,731	\$11,365	\$13,346	\$2,032,375.5
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	8,673	-	3,784	-	-	-	-	12,457
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	69.6%	0.0%	30.4%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	499	-	521	-	-	-	-	1,020
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	48.9%	0.0%	51.1%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	54	-	25	-	-	-	-	79
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	68.1%	0.0%	31.9%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 9

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$80,440	\$46,384	\$546,821	\$659,888	\$839,002	\$933,500	\$1,131,115	\$1,367,963	\$971,923	\$351,562	\$68,769	\$39,611	\$46,516	\$7,083,494.0
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	12,559	-	19,696	-	-	-	-	32,255
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	38.9%	0.0%	61.1%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	1,797	-	1,354	-	-	-	-	3,151
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	57.0%	0.0%	43.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	108	-	117	-	-	-	-	225
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	47.9%	0.0%	52.1%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 10

TOTAL AREA														
MassBroadband 123														
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$32,926	\$18,986	\$223,828	\$270,109	\$343,426	\$382,106	\$462,995	\$559,943	\$397,834	\$143,904	\$28,149	\$16,214	\$19,040	\$2,899,461.3
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	7,554	3,615	2,079	-	-	-	-	13,249
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	57.0%	27.3%	15.7%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	617	198	394	-	-	-	-	1,209
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	51.0%	16.4%	32.6%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	92	12	24	-	-	-	-	128
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	72.1%	9.0%	18.9%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 11

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$8,145	\$4,697	\$55,367	\$66,815	\$84,951	\$94,519	\$114,528	\$138,509	\$98,409	\$35,596	\$6,963	\$4,011	\$4,710	\$717,219.1
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	1,170	-	-	-	-	-	-	1,170
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	180	-	-	-	-	-	-	180
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	9	-	-	-	-	-	-	9
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 12

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$57,152	\$32,956	\$388,512	\$468,845	\$596,104	\$663,244	\$803,648	\$971,927	\$690,544	\$249,782	\$48,860	\$28,143	\$33,049	\$5,032,767.4
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	50,156	11,126	-	-	-	-	-	61,282
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	81.8%	18.2%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	4,851	1,599	-	-	-	-	-	6,450
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	75.2%	24.8%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	127	48	-	-	-	-	-	175
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	72.5%	27.5%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 13

TOTAL AREA		MassBroadband 123												
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$7,858	\$4,531	\$53,419	\$64,464	\$81,962	\$91,194	\$110,499	\$133,636	\$94,947	\$34,344	\$6,718	\$3,870	\$4,544	\$691,986.4
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	1,888	-	-	-	-	-	-	1,888
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	237	-	-	-	-	-	-	237
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	7	-	-	-	-	-	-	7
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100%

18.3 Build-Out Time Line Part 2 - Service Area 14

TOTAL AREA														
MassBroadband 123														
	Year 0	Year 1				Year 2				Year 3				Total
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Infrastructure Funds														
Infrastructure Funds Advanced (estimate)	\$235,824	\$135,983	\$1,603,101	\$1,934,574	\$2,459,677	\$2,736,715	\$3,316,057	\$4,010,418	\$2,849,358	\$1,030,665	\$201,609	\$116,126	\$136,369	\$20,766,474.7
Percent of Total Funds	1.1%	0.7%	7.7%	9.3%	11.8%	13.2%	16.0%	19.3%	13.7%	5.0%	1.0%	0.6%	0.7%	100.0%
Entities Passed & %														
Households	-	-	-	-	-	-	107,175	58,136	69,704	-	-	-	-	235,014
Percentage of Households	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.6%	24.7%	29.7%	0.0%	0.0%	0.0%	0.0%	100%
Businesses	-	-	-	-	-	-	11,116	5,854	7,568	-	-	-	-	24,538
Percentage of Total Businesses	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	45.3%	23.9%	30.8%	0.0%	0.0%	0.0%	0.0%	100%
Strategic Institutions	-	-	-	-	-	-	486	320	251	-	-	-	-	1,056
Percentage of Total Institutions	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	46.0%	30.3%	23.8%	0.0%	0.0%	0.0%	0.0%	100%

BUDGET INFORMATION - Construction Programs

OMB Approval No. 4040-0008
Expiration Date 07/30/2010

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	\$ 2,009,190.00	\$	\$ 2,009,190.00
2. Land, structures, rights-of-way, appraisals, etc.	\$	\$	\$ 0.00
3. Relocation expenses and payments	\$	\$	\$ 0.00
4. Architectural and engineering fees	\$ 9,179,028.00	\$	\$ 9,179,028.00
5. Other architectural and engineering fees	\$	\$	\$ 0.00
6. Project inspection fees	\$ 2,218,560.00	\$	\$ 2,218,560.00
7. Site work	\$	\$	\$ 0.00
8. Demolition and removal	\$	\$	\$ 0.00
9. Construction	\$ 51,193,858.00	\$	\$ 51,193,858.00
10. Equipment	\$ 7,044,808.00	\$	\$ 7,044,808.00
11. Miscellaneous	\$	\$	\$ 0.00
12. SUBTOTAL (sum of lines 1- 11)	\$ 71,645,444.00	\$ 0.00	\$ 71,645,444.00
13. Contingencies	\$	\$	\$ 0.00
14. SUBTOTAL	\$ 71,645,444.00	\$ 0.00	\$ 71,645,444.00
15. Project (program) income	\$	\$	\$ 0.00
16. TOTAL PROJECT COSTS (subtract #15 from #14)	\$ 71,645,444.00	\$ 0.00	\$ 71,645,444.00
FEDERAL FUNDING			
17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter eligible costs from line 16c Multiply X <input type="text" value=".63431"/> % Enter the resulting Federal share.			\$ 45,445,444.00

INSTRUCTIONS FOR THE SF-424C

Public reporting burden for this collection of information is estimated to average 180 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0041), Washington, DC 20503.

**PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET.
SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.**

This sheet is to be used for the following types of applications: (1) "New" (means a new [previously unfunded] assistance award); (2) "Continuation" (means funding in a succeeding budget period which stemmed from a prior agreement to fund); and (3) "Revised" (means any changes in the Federal Government's financial obligations or contingent liability from an existing obligation). If there is no change in the award amount, there is no need to complete this form. Certain Federal agencies may require only an explanatory letter to effect minor (no cost) changes. If you have questions, please contact the Federal agency.

Column a. - If this is an application for a "New" project, enter the total estimated cost of each of the items listed on lines 1 through 16 (as applicable) under "COST CLASSIFICATION."

If this application entails a change to an existing award, enter the eligible amounts *approved under the previous award* for the items under "COST CLASSIFICATION."

Column b. - If this is an application for a "New" project, enter that portion of the cost of each item in Column a. which is *not* allowable for Federal assistance. Contact the Federal agency for assistance in determining the allowability of specific costs.

If this application entails a change to an existing award, enter the adjustment [+ or (-)] to the previously approved costs (from column a.) reflected in this application.

Column . - This is the net of lines 1 through 16 in columns "a." and "b."

Line 1 - Enter estimated amounts needed to cover administrative expenses. Do not include costs which are related to the normal functions of government. Allowable legal costs are generally only those associated with the purchases of land which is allowable for Federal participation and certain services in support of construction of the project.

Line 2 - Enter estimated site and right(s)-of-way acquisition costs (this includes purchase, lease, and/or easements).

Line 3 - Enter estimated costs related to relocation advisory assistance, replacement housing, relocation payments to displaced persons and businesses, etc.

Line 4 - Enter estimated basic engineering fees related to construction (this includes start-up services and preparation of project performance work plan).

Line 5 - Enter estimated engineering costs, such as surveys, tests, soil borings, etc.

Line 6 - Enter estimated engineering inspection costs.

Line 7 - Enter estimated costs of site preparation and restoration which are not included in the basic construction contract.

Line 9 - Enter estimated cost of the construction contract.

Line 10 - Enter estimated cost of office, shop, laboratory, safety equipment, etc. to be used at the facility, if such costs are not included in the construction contract.

Line 11 - Enter estimated miscellaneous costs.

Line 12 - Total of items 1 through 11.

Line 13 - Enter estimated contingency costs. (Consult the Federal agency for the percentage of the estimated construction cost to use.)

Line 14 - Enter the total of lines 12 and 13.

Line 15 - Enter estimated program income to be earned during the grant period, e.g., salvaged materials, etc.

Line 16 - Subtract line 15 from line 14.

Line 17 - This block is for the computation of the Federal share. Multiply the total allowable project costs from line 16, column "c." by the Federal percentage share (this may be up to 100 percent; consult Federal agency for Federal percentage share) and enter the product on line 17.

ASSURANCES - CONSTRUCTION PROGRAMS

OMB Approval No. 4040-0009
Expiration Date 07/30/2010

Public reporting burden for this collection of information is estimated to average 15 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0042), Washington, DC 20503.


PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the Awarding Agency. Further, certain Federal assistance awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.
2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, the right to examine all records, books, papers, or documents related to the assistance; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.
3. Will not dispose of, modify the use of, or change the terms of the real property title, or other interest in the site and facilities without permission and instructions from the awarding agency. Will record the Federal awarding agency directives and will include a covenant in the title of real property acquired in whole or in part with Federal assistance funds to assure non-discrimination during the useful life of the project.
4. Will comply with the requirements of the assistance awarding agency with regard to the drafting, review and approval of construction plans and specifications.
5. Will provide and maintain competent and adequate engineering supervision at the construction site to ensure that the complete work conforms with the approved plans and specifications and will furnish progress reports and such other information as may be required by the assistance awarding agency or State.
6. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.
7. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.
8. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).
9. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.
10. Will comply with all Federal statutes relating to non-discrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§1681 1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

11. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal and federally-assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.
12. Will comply with the provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.
13. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333) regarding labor standards for federally-assisted construction subagreements.
14. Will comply with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is \$10,000 or more.
15. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).
16. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.
17. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).
18. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-1 33, "Audits of States, Local Governments, and Non-Profit Organizations."
19. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

*SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL 	*TITLE Chief Financial Officer
*APPLICANT ORGANIZATION Massachusetts Technology Park Corporation	*DATE SUBMITTED March 25, 2010 0.00



Comprehensive Community Infrastructure **Budget Narrative Template**

Applicant Name: Massachusetts Technology Collaborative

EasyGrants Number: 4722

Organization Type: State Agency

Proposed Period of Performance: October 1, 2010 to June 1, 2013

Total Project Costs: \$71,645,444

Total Federal Grant Request: \$45,445,444

Total Matching Funds (Cash): \$23,088,647

Total Matching Funds (In-Kind): \$3,111,353

Total Matching Funds (Cash + In-Kind): \$26,200,000

Total Matching Funds (Cash + In-Kind) as Percentage of Total Project Costs: 36.57%

1. Administrative and legal expenses - \$2,009,190

- Provide a breakout of position(s), time commitment(s) such as hours or level-of-effort, and salary information/rates with a detailed explanation, and additional information as needed.

Included in this category are the costs of staff, consultants, auditors, and outside legal firms providing assistance with application preparation, general project and award implementation and oversight, compliance, and other required services to insure a successful implementation of all of the objectives of this project.

1. Proposal Preparation-Release of NOFA through submission of Proposal

A. Staff costs of \$109,992 are included in this category. These costs consist of (i) direct salaries related to the portions of time that the applicant's MBI Director, Construction Project Manager, MBI Deputy Director, and compliance staff are performing direct services related to preparing the application for the period from the release of the NOFA through submission of the proposal, (ii) fringe benefits, based upon a fringe benefits rate of 35.23%, which is the actual current fringe rate for benefits provided to applicant's employees, and (iii) indirect corporate services charge at the rate of 76.02% of personnel costs (salaries and fringe), a rate that federal agencies recently approved for use by the applicant, most notably in January 2010 when the Department of Commerce awarded MBI a State Broadband Data and Development Grant. All personnel costs are based upon the actual hourly rates for each existing staff



Broadband Technology Opportunities Program (BTOP)

position or the projected rate for any new positions, plus an estimated 3% increase per year. A more detailed breakdown of the staff time and other charges is set forth in the following table.

Staff	% of effort	Months	Annual Salary	Total Cost
MBI Director	75%	2	140,000	17,500
MBI Deputy Director	50%	2	95,000	7,917
Construction Project Manager	80%	2	95,000	12,667
Compliance Staff	50%	2	97,500	8,125
Total Proposal Preparation Salaries				46,209
Fringe Benefits (35.23%)				16,279
Indirect Costs (76.02% of salaries and fringe)				47,504
Total Proposal Preparation Staff Costs				\$109,992

B. Professional and consulting fees of \$632,780 are included in this category. This consists of proposal preparation services performed by contractors and consulting firms, including assistance with network design and engineering, budgeting, mapping, sustainability modeling, legal advice, environmental due diligence, construction and procurement planning, and other required services to prepare the application and detailed project plan. The services were performed by various consulting firms and contractors between the period of the release of the NOFA and proposal submission. The budget is based upon actual fixed price contracts where applicable and an estimate of the number of hours worked and to be worked by non-fixed price contractors and consulting firms during the period and an estimate of the blended hourly rate of these contractors and consulting firms. We know the applicable hourly rates of these contractors and consulting firms, as they are specified in the contracts and work orders we have entered into with these firms; the estimate we are making relates to an estimated blended hourly rate

2. Compliance and Other Costs-Post Proposal Submission through End of Construction

A. Staff costs of \$628,424 are included in this category. These costs consist of (i) direct salaries related to the portions of time that the applicant's compliance staff are performing direct services related to all legal, federal and state compliance, as well as with all construction and procurement matters associated with the MassBroadband 123 project, (ii) fringe benefits and (iii) indirect corporate services costs based on the rates described above. All personnel costs are based upon the actual hourly rates for each existing staff position or the projected rate for any new positions, plus an estimated 3% increase per year. A more detailed breakdown of the staff time and other charges is set forth in the following table.

Staff	% of effort	Months	Annual Salary	Total Cost
Compliance Staff (Project Yr 0)	50%	6	98,963	24,741
Compliance Staff (Project Yr 1)	100%	12	101,178	101,178
Compliance Staff (Project Yr 2)	75%	12	104,214	78,160
Compliance Staff (Project Yr 3)	75%	9	106,541	59,929
Total Compliance Salaries				264,008
Fringe Benefits (35.23%)				93,010



Indirect Costs (76.02% of salaries and fringe)	271,405
Total Compliance Staff Costs	\$ 628,424

B. Included in this category are Audit Services for A-133 Compliance Requirements budgeted at \$25,000 per year for the three year award period. This is based upon an estimate from MTC's audit firm, Deloitte and Touche. The total budget for this activity is \$75,000.

C. Included in this category are Legal Services for construction procurement, permitting, IRU and lease negotiation, and other required legal matters related to the project. The costs are budgeted to be \$425,000 over the three year period at an estimated blended rate of \$500 per hour for 850 hours. This blended rate is consistent with, and reflects, the rates charged by applicant's attorneys on similar matters pursuant to competitively procured legal services contracts.

D. Included in this category are Office Facility Charges related to the staffing on the project. The Office Facility Charge is a direct cost based upon the salary dollars of applicant's staff working on this project. The rate applies equally across all of applicant's programs and reflects applicant's actual facilities costs. The rate applied per dollar of salary is \$0.13, and the total cost for this item for the period from submission of the application to construction completion is \$137,995.

- Provide detailed description, calculation, and basis of evaluation for each Cash Matching Funds source.

The cash matching for this category is based upon prorating the source of cash match {Massachusetts Broadband Institute (MBI), Commonwealth of Massachusetts, Executive Office of Public Safety and Security (EOPSS), or Commonwealth of Massachusetts, Information and Technology Division (ITD)} over total cash match for the project (not including the cash match portion attributable to the I-91 costs, which is handled separately in the Construction Category of this Budget Narrative) multiplied by the category total. For this category, the resulting amounts are:

Cash Source 1: MBI funds will be used for 22.6962% of this category, for a total of \$456,009

Cash Source 2: EOPSS funds will be used for 4.6401% of this category, for a total of \$93,229.

Cash Source 3: ITD funds will be used for 4.6401% of this category, for a total of \$93,229.

- Provide detailed description, calculation, and basis of evaluation for each In-Kind Matching Funds source.

None

2. Land, structure, rights-of-way, appraisals, etc. - \$0

3. Relocation expenses and payment - \$0



4. Architectural and engineering fees - \$9,179,028

- Provide description of estimated fees, rates, explanation of proposed services, and additional information as needed.

Architectural and engineering services will be provided by an architecture engineering firm procured through a competitive request for proposal process following the applicable Commonwealth of Massachusetts design and construction rules. Services to be procured include the detailed engineering, design build contractor, and Project Management/Construction Management.

Architectural and engineering fees are based on the staffing plan provided on the following page.

The staffing plan was developed by Jacobs Engineering Group Inc. Loaded hourly rates are based on actual average category rates for each of the engineering and design labor categories. These labor rates are consistent with the labor rates of architectural engineering firms in Massachusetts.

Level of effort estimates are based on route miles of the network, the network design and the number of community anchor institutions served. The engineering effort is based on the number of plan sheets (C-Size) required to depict the cable running line at 200:1 scale. This is a customary scaled and plan presentation for outside plant design.

Architectural and engineering services include the following:

ENGINEERING

- Network Engineering (\$142,836) – Development of final network engineering details and specifications for procurement documents, development of IP addressing schema and completion of network details coordinated with the network operator. The work includes development of the cable management plan working with the network operator that will integrate with a GIS based asset management system.
- Outside Plant Engineering (\$2,357,632)
 - Base Plan Development – An estimated 730 base plans will be prepared from Mass GIS photogrametry. Base plans will be prepared at 200:1 scale. Two hours of CAD time are estimated for the development of each plan sheet.
 - Permitting and Licensing – Completion of the environmental assessment and attainment of the finding of no significant impact; completion of all required environmental permits; and completion and submission of utility pole attachment licenses. Approximately 35,000 pole attachment licenses will be required.
 - Survey and field reseach - Work includes inventory of pole numbers; survey for placement transitions from aerial to underground, aerial to bridge attachment; entry to the major and local facility nodes; development of new pole line; geospatial data collection; environmental data collection and delineation; and other field data collection efforts.
 - Detailed Engineering – Completion of the engineering plans, construction details, specifications and estimate for construction procurement. The base plans provide the starting point for the preparation of the plans. Information obtained during the field research is placed on the plans. Site specific construction details are prepared. Tabulation of units is prepared. A complete plan set is prepared.



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WORK PLAN	PM					Engineering					Construction			Total Hours	Estimated Fee	Average Hourly Rate
	Project Principal	Program Manager	Project Scheduler/ Supply Chain Manager	Safety Officer	Quality Assurance Manager	Engineering Manager	Senior Engineer	Engineer	Senior Designer	Designer/CADD	Construction Project Manager	Resident Engineer/ Superintendent	Construction Inspector			
ENGINEERING																
Network Engineering						140	40	528	216	212				1136	\$ 142,836	\$125.74
OSP Engineering																
Base Plan Development							120			1460				1580	\$ 156,960	\$99.34
Permitting and Licensing						672	1640	4248						6560	\$ 820,552	\$125.08
Survey and field research						480	600	960		2880				4920	\$ 560,640	\$113.95
Detailed Engineering						360	1080	3840		1920				7200	\$ 819,480	\$113.82
Building (Inside Plant) Engineering																
Base Plan Development						24		80		600				704	\$ 71,032	\$100.90
Survey						24		64		504				592	\$ 60,104	\$101.53
Site Acquisition							40	40						80	\$ 9,880	\$123.50
Permitting						84	252	168						504	\$ 70,308	\$139.50
Detailed Engineering						64	528	572		704				1868	\$ 215,700	\$115.47
PROGRAM MANAGEMENT/CONSTRUCTION MANAGEMENT																
Pre-Construction Activities																
Construction Document Preparations (3 regional builds)						240	720							960	\$ 149,520	\$155.75
Bid/Award Support Services						240	720							960	\$ 149,520	\$155.75
Construction Activities																
Construction Related Services (CRS)		4800	4800											9600	\$ 1,584,000	\$165.00
RFI, Submission Reviews and Approvals						96	1760	960						2816	\$ 368,608	\$130.90
Quality Assurance Program					1200									1200	\$ 180,000	\$150.00
Safety Program				1580										1580	\$ 237,000	\$150.00
TESTING																
Network Elements								10,128						10128	\$ 1,083,696	\$107.00
IT System Elements								2,784						2784	\$ 297,888	\$107.00
Total	0	4,800	4,800	1,580	1,200	2,424	7,500	24,372	216	8,280	0	0	0	55,172	\$ 6,977,724	\$ 126.47
Loaded Rate	\$225.00	\$225.00	\$105.00	\$150.00	\$150.00	\$203.00	\$140.00	\$107.00	\$148.00	\$96.00	\$205.00	\$158.00	\$100.00			



Broadband Technology Opportunities Program (BTOP)

- Building (Inside Plant) Engineering (\$427,024)
 - Base Plan Development – Plans are prepared for the rooms at 1 Federal Street and for a typical Community Anchor Institution hosting either a Major Centralized Facility node or a Local Centralized Facility Node.
 - Survey – Field survey will be performed of the 22 major and local centralized facility nodes to determine cable entry and inside construction requirements.
 - Site Acquisition – Completion of agreements for placing indoor equipment and outdoor equipment cabinets with the Community Anchor Institution hosting centralized and local facility nodes. These agreements will incorporate information from the survey and detailed engineering plans.
 - Detailed Engineering – Completion of the plans, construction details and typicals, specifications and engineers estimate of inside plant construction requirements. Four plan sheets are anticipated for each facility node. These sheets will include layout plan and details to include electrical service, rack layout, risers, quantity tabulations and other information as required to facilitate the construction of the inside plant.

PROGRAM MANAGEMENT / CONSTRUCTION MANAGEMENT

- Pre-Construction Activities (\$299,040)
 - Construction Document Preparations – A design build unit price contract is anticipated for the construction of the network. The work in this task represents the preparation of work release packages to the design build contractor. Packages will be released for construction as all permits and licenses are obtained. Three regional builds are anticipated and packages will be released within each region. These builds will be concurrent.
 - Bid/Award Support Services – This task includes the review of bid submissions for compliance with the detailed plans and specifications of the project. The work includes review of proposals submitted by design build contractors. In addition, once the contract is awarded there will be additional work packages issued to the design build contractor for pricing. This effort includes the review of the work package pricing for conformance with the design build agreement and its unit pricing.
- Construction Activities (\$2,369,608)
 - Construction Related Services (CRS) – This line item in the budget encompasses the PM/CM contract's project manager and associated project management activities to include project schedule maintenance, contracts management, invoice validation, document control; meetings and coordination, et al. This effort is estimated to require 2 full time equivalents (FTEs) over 30 months.
 - Response to Design/Build Contractor submitted RFIs, Submission Reviews and Approvals – Throughout the course of construction the design build contractor will submit to MBI requests for information (RFIs) to clarify the construction requirements and to address field conditions. The RFIs will be reviewed by project engineers and responses developed as required. This work item also includes the review of as-built drawing and other submissions by the design build contractor in the normal course of project construction and completion.
 - Quality Assurance Program – The work effort for the quality assurance program corresponds to the work of the quality manager who is responsible for auditing the project on a regular basis to check that the project plan developed by the PM/CM contractor is consistently



Broadband Technology Opportunities Program (BTOP)

followed, that the document management and control system is uniformly implemented and to ensure that the project is properly documented from detailed engineering plans to as-built drawings. The effort estimated for this work element is 0.25 FTEs over a 30 month period.

- o Safety Program – The work effort for the safety program corresponds to the effort of the project safety officer. The project safety officer is responsible for overseeing conformance of the project to the safety plan that is part of the project management plan. The safety officer has the authorization to stop work in the event that safety violations are identified and not immediately remedied. The effort estimated for this work element is 0.33 FTEs over a 30 month period.
- Construction Engineering and Inspection (CEI) - Field Services (\$2,218,560)
 - o The CEI effort corresponds to one full time Resident Engineer/Superintendent and four (4) full time construction inspectors. The work of the CEI program is to inspect and validate the construction against the detailed engineering plans and project specifications. Construction inspectors will be assigned to spot inspect multiple design build contractor crews working concurrently. The records maintained by the inspectors will be used to validate invoices submitted by the design build contractor and to provide field information to the project scheduler regarding work completed on a daily basis.

TESTING

- Network Elements (\$1,083,696) – The PM/CM contractor will review and approve test plans prepared and submitted by the design build contractor. The PM/CM contractor oversees all tests and validates that the test procedures were properly implemented and that the test results are correctly recorded. Fiber optic cables will be tested on the reel as well as after installation, splicing and termination. Optical Time Domain Reflectometer (OTDR) and power testing of 300 links estimated.
- IT System Elements (\$297,888) - PM/CM contractor will review and approve test plans prepared by the design build contractor and oversee all tests. PM/CM contractor will oversee all network equipment tests to include factor acceptance test/certification, stand alone installation test; system test and network test as a minimum. These tests are conducted at major and local central facility nodes and at Community Anchor Institutions. Four hours per site installation is assumed for testing.

OTHER STAFFING AND SERVICES

Also included in this category are the staffing, services, and consulting fees incurred by the Massachusetts Broadband Institute for the MassBroadband 123 program during the post submission phase which are not included in the services described in this category or the work plan above.

MBI Staff costs of \$1,788,288 are included in this category. These costs consist of direct salaries related to the portions of time that the applicant's staff are performing direct services related to post submission activities for the MassBroadband 123 project, and fringe benefits and indirect costs based on the rates described in Section 1 of this Budget Narrative. All personnel costs are based upon the actual hourly rates for each existing staff position or the projected rate for any new positions, plus an estimated 3% increase per year. A more detailed breakdown of the staff time and other charges is set forth in the following table.

Staff	Year	%of effort	Months	Annual Salary	Total Cost
MBI Director	0	50%	6	142,100	35,525
MBI Director	1	30%	12	145,282	43,584
MBI Director	2	20%	12	149,640	29,928
MBI Director	3	20%	9	152,983	22,947
MBI Deputy Director	0	50%	6	96,425	24,106
Construction Project Manager	0	80%	6	96,425	38,570



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Construction Project Manager	1	100%	12	98,584	98,584
Construction Project Manager	2	100%	12	101,541	101,541
Construction Project Manager	3	100%	9	103,810	77,857
Clerk of the Works	1	100%	12	101,178	101,178
Clerk of the Works	2	100%	12	104,213	104,213
Clerk of the Works	3	92%	9	106,541	73,246
Total Salaries					751,281
Fringe Benefits (35.23%)					264,676
Indirect Costs (76.02% of salaries and fringe)					772,331
Total Post-Submission Staff Costs					\$1,788,288

Other Professional and consulting services fees of \$413,015 are included in this category. This consists of services to be performed by contractors and consulting firms, including assistance with network engineering, environmental due diligence, construction and procurement planning, and other required services between the period of proposal submission and the official start of Project Year 1 and the procurement of the services referenced above. The budget is based upon the estimated hourly rates based upon similar services competitively procured by the applicant in the past and the estimated number of hours for each of the consultants procured/to be procured.

- Provide detailed description, calculation, and basis of evaluation for each Cash Matching Funds source.

The cash matching for this category is based upon prorating the source of cash match (MBI, EOPSS, or ITD) over total cash match for the project (not including the cash match portion attributable to the I-91 costs, which is handled separately in the Construction Category of this Budget Narrative) multiplied by the category total. For this category, the resulting amounts are:

Cash Source 1: MBI funds will be used for 22.6962% of this category, for a total of \$2,083,289

Cash Source 2: EOPSS funds will be used for 4.6401% of this category, for a total of \$425,919.

Cash Source 3: ITD funds will be used for 4.6401% of this category, for a total of \$425,919.

- Provide detailed description, calculation, and basis of evaluation for each In-Kind Matching Funds source.

None

5. Other architectural and engineering fees - \$0

6. Project inspection fees - \$2,218,560

- Provide description of estimated fees, rates, explanation of proposed services, and additional information as needed.



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This work element incorporates the Construction Engineering and Inspection line item from the Staff Plan developed by Jacobs Engineering Group Inc. The work involved includes the routine inspection of the construction to assure compliance with the project detailed engineering plans and project specifications. The work effort includes a Resident Engineer over a 27 month period and four Inspectors over a period of 24 months. Hourly labor rates are based upon prevailing wage.

Level of effort and fee estimate are developed as follows

WORK PLAN	Construction			Total Hours	Estimated Fee	Average Hourly Rate
	Construction Project Manager	Resident Engineer/ Superintendent	Construction Inspector			
Construction Engineering and Inspection (CEI) - Field		4320	15360	19680	\$ 2,218,560	\$112.73
Total	0	4,320	15,360	19,680	\$ 2,218,560	\$ 112.73
	Loaded Rate	\$205.00	\$158.00	\$100.00		

- Provide detailed description, calculation, and basis of evaluation for each Cash Matching Funds source.

The cash matching for this category is based upon prorating the source of cash match (MBI, EOPSS, or ITD) over total cash match for the project (not including the cash match portion attributable to the I-91 costs, which is handled separately in the Construction Category of this Budget Narrative) multiplied by the category total. For this category, the resulting amounts are:

Cash Source 1: MBI funds will be used for 22.6962% of this category, for a total of \$503,528

Cash Source 2: EOPSS funds will be used for 4.6401% of this category, for a total of \$102,944.

Cash Source 3: ITD funds will be used for 4.6401% of this category, for a total of \$102,944.

- Provide detailed description, calculation, and basis of evaluation for each In-Kind Matching Funds source.

None

7. Site work - \$0

8. Demolition and removal - \$0



9. Construction - \$51,193,858

- Provide description of estimated fees, rates, explanation of proposed services, state whether the work is being completed by the applicant or an outside contractor, and additional information as needed.

MBI anticipates that the construction work will be executed by a Design Build Contractor. Procurement of the contractor will be based upon applicable Massachusetts and applicant procurement regulations.

Construction costs are summarized as follows:

Construction Item	Estimated Cost
<u>Outside Plant Construction</u>	\$ 50,137,468
Cables - Includes material, make ready, police details, and installation labor	\$ 38,466,713
Conduit	\$ 1,041,360
Poles and Attachments	\$ 3,819,840
Other – Includes splice cases, butt splices, fiber terminations and panels, handholes and manholes, and CAI drop splices	\$ 2,683,980
IRU Purchase (NEREN and UMass MITI)	\$ 4,125,575
<u>Building (Inside Plant Construction)</u>	\$ 1,056,390

Development of the construction cost estimate followed a build-up methodology that included the development of unit prices for materials, make ready work, police details and installation labor.

Unit costs for materials was based on material costs quotes received from vendors and local area contractors as referenced in the Reasonableness column on the Detailed Budget. When materials quotes were not available, similar project bid information was used from the Massachusetts Department of Transportation’s I-91 ITS Design Build project that is constructing a portion of the MassBroadband 123 network and from other similar telecommunications projects recently bid in Vermont, New Hampshire and Maine.

Cable materials costs are as follows:

<u>Cable Type</u>	<u>Cost per ft.</u>
288 SM ADSS Fiber	\$2.27772
144 SM ADSS Fiber	\$1.3778
96 SM ADSS Fiber	\$1.0004
48 SM ADSS Fiber	\$0.6862
12 SM ADSS Fiber	\$0.5641



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Installation and other cable costs were developed as follows:

<u>Cable Installation Component</u>	<u>Cost per ft.</u>
Make Ready Cost	\$2.63
Site Survey	\$0.35
Installation Labor (Aerial)	\$1.69
Installation Labor (Conduit)	\$2.19
Yard, Storage, Security, Trailer	\$0.0443

Make ready work is conducted by the local utilities and charged back to MBI based on the licence application submitted by MBI to the utility. The work includes development of the installation location on the pole and may require the replacement of the pole when the pole condition is adequate to support additional cable. Make ready costs were developed based on an actual aerial fiber optic installation of a 53 mile network in western Massachusetts for Five Colleges Net, LLC as well as other relevant quotes and benchmarks.

Site survey costs work is performed by the design build contractor in preparation for the installation work and verification of the detailed engineering plans. This unit cost was verified by regional contractors.

Installation labor costs are based on prevailing wage for Journeyman Lineman of \$54.66 per hour and Groundsman / Truckdriver of \$41.55 effective Aug 2008. This rate is inflated \$2.00 per year from Union rate tables based on the current labor agreement. Included in the labor costs is also the cost of police details required by the Commonwealth of Massachusetts at \$50.00 per hour and the cost of the lineman truck at \$50 per hour. Crews include the Lineman and Groundsman/Truck Driver and have a productivity rate of 2,000 ft. per day.

Conduit installation costs includes rod and roping of the existing conduits to validate the feasibility for cable installation.

The cost of the contractor's yard includes storage security and a trailer to be located with the service area. Total cost of the yard and trailer is estimated to be \$250,000 over the construction period. The cost was developed from the yard costs for a similar project in Maine for the Department of Information Technology.

The resulting aggregate cost information was validated with personnel from internet service providers with physical assets in New England and regional contractors.

Quantities of materials were developed from a fully designed cable route. This route was field viewed to validate the availability and suitability of poles for aerial installation, the requirement for new poles, the availability of existing conduit, and the requirement for new conduit. The objective of this design effort was to minimize risk that new pole or conduit installation would be required and to more accurately forecast the costs of fiber deployment. In addition, the network design effort included the determination of cable strand counts by route segment to ensure that there would be adequate fiber strands for the services sold to CAIs and last mile providers based on customer up-take assumptions from the sustainability model.



The results of this design effort is as follows:

Installation Type	Fiber Optic Cable Route Miles by Type (No. of Strands)						Total	Percent
	12	48	72	96	144	288		
Existing Pole	8.53	239.55	27.99	44.33	333.34	214.88	868.62	85.79%
New Pole	0	1.32	0.75	0.65	5.02	0.71	8.45	0.83%
New Conduit	0	0	0	0	0	0.66	0.66	0.07%
Existing Conduit	0	1.09	0	3.43	3.88	11.64	20.04	1.98%
I-91 Build Post 1/10/10						36.58	36.58	3.61%
Drops to CAIs	78.10						78.10	7.71%
Total	86.63	241.96	28.74	48.41	342.24	264.47	1012.45	100.00%
Percentage	8.6%	23.9%	2.8%	4.8%	33.8%	26.1%	100.0%	

IRU costs were developed differently for NEREN and UMass MITI. NEREN provided MBI with a price quote for 15 years, included in their letter. UMass MITI currently has a current five year lease for an IRU with rights to renew. MBI plans to work with UMass MITI to convert this into a 19 year IRU for MBI's use, with UMass MITI becoming an MBI customer for that route. The cost was estimated based on the NPV of the UMass MITI contract with the fiber owner.

- Provide detailed description, calculation, and basis of evaluation for each Cash Matching Funds source.

The cash matching for this category is calculated in two steps. First, the cash matching for this category includes \$1,725,691 of funds from MBI to cover 100% of the costs budgeted to complete the 55 mile I-91 fiber network that are expected to be incurred from the date of the NOFA through completion of the project. The second calculation involves prorating the source of cash match (MBI, EOPSS, or ITD) over total cash match for the project (not including the MBI specific cash match portion attributable to the I-91 costs referred to in the preceding sentence) multiplied by the category total (again, not including all I-91 related costs which are applied as matching funds separately). For this category, the resulting amounts are:

Cash Source 1: \$1,725,691 of MBI funds will be used as matching for 100% of the costs for the I-91 55 mile fiber network incurred from the date of the NOFA through completion. In addition, \$10,521,227 of MBI funds will be used for 22.6962% of the remaining costs in this category. The total of these two amounts of MBI cash match for this category is \$12,246,918.

Cash Source 2: EOPSS funds will be used for 4.6401% of this category, for a total of \$2,151,019.

Cash Source 3: ITD funds will be used for 4.6401% of this category, for a total of \$2,151,019.

- Provide detailed description, calculation, and basis of evaluation for each In-Kind Matching Funds source.

In-Kind Source 1: MBI will provide a total in-kind matching funds related to the partial completion of the I-91 project of \$3,111,353. MBI had incurred costs prior to the date of the NOFA release for construction of 18.9 miles of the 55 mile I-91 fiber network that will become part of the MassBroadband 123 project once it completed. The 55 miles of fiber and conduit installed in the I-91 project will be a major component of the proposed project and therefore the associated costs incurred prior to the release of the NOFA are being considered in-kind match provided from the proceeds of state bond funds allocated to MBI. The costs included in the in-kind match are the costs associated with installing conduit and approximately 18.9 miles of fiber plus the costs associated with engineering, field review, and construction oversight.



10. Equipment - \$ 7,044,808

- Provide a list of equipment in the form of a table with description, number of units, unit cost, state whether it is being purchased or leased, and additional information as needed.

Equipment costs were developed by receiving quotations from multiple vendors, using the state discount off manufacturer list prices. Fully detailed bill of materials are available for each item described below. Since MBI is a state entity, competitive procurement and state “buying power” will yield favorable discounts.

Network equipment can be grouped into three categories that include:

- Switching for Carrier Ethernet;
- Transport – DWDM;
- Transport – SONET;
- Access – SONET; and
- Customer Premise Equipment

Equipment costs were developed by receiving quotations from multiple vendors, using the existing state discount off manufacturer list prices. Fully detailed bill of materials are available for each item described below.

All equipment is being purchased. Costs shown below include installation services.

Switching:

Carrier Ethernet (EPL and EVPL) is the predominant service delivery methodology for MassBroadband 123. Ethernet switches are located at each Centralized Facility node with one or more 10 Gigabit uplinks and a sufficient number of 1 Gigabit ports for delivering service to the region served by that node. The switches are sized to accommodate some growth, but have been “right” sized for the region they serve. All switches are carrier class with redundant power and high reliability.

Following is a breakdown of the ports counts and costs for the Carrier Ethernet switches at each node:

Node	ETHERNET SWITCHING		SWITCH	ETHERNET
	10 Gig	1G Optical	CLASSIFICATION	SWITCH COST
SPRINGFIELD	4	240	Core	\$ 204,989.41
GREENFIELD	2	192	Core	\$ 204,989.41
NORTHAMPTON	2	144	Core	\$ 204,989.41
PITTSFIELD	2	144	Core	\$ 204,989.41
HOLYOKE	2	96	Large	\$ 135,805.12
NORTH ADAMS	2	96	Large	\$ 135,805.12
GREAT BARRINGTON	1	48	Large	\$ 135,805.12



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ORANGE	2	96	Large	\$ 135,805.12
WESTFIELD	2	96	Large	\$ 135,805.12
BELCHERTOWN	1	48	Large	\$ 135,805.12
LEE	1	48	Large	\$ 135,805.12
SANDSFIELD	1	48	Large	\$ 135,805.12
CHARLEMONT	1	24	Small	\$ 36,317.32
HINSDALE	1	24	Small	\$ 36,317.32
WESTMINSTER	1	24	Small	\$ 36,317.32
PLAINFIELD	1	24	Small	\$ 36,317.32
GOSHEN	1	24	Small	\$ 36,317.32
NEW BRAINTREE	1	24	Small	\$ 36,317.32
RUSSELL	1	24	Small	\$ 36,317.32
BECKET	1	24	Small	\$ 36,317.32
AYER	1	24	Small	\$ 36,317.32
SAVOY	1	24	Small	\$ 36,317.32
STURBRIDGE	1	24	Small	\$ 36,317.32
BOSTON	4	48	Large	\$ 135,805.12
TOTAL				\$ 2,441,694.24

Transport – DWDM

Reconfigurable Optical Add-Drop Multiplexers (ROADM) are used at strategic locations throughout the network to deliver DWDM capacity over wavelengths where needed. Each ROADM can support up to 40 unique 10 Gigabit wavelengths (lambdas), but will initially be configured to support two wavelengths. ROADMs are also specified in 2 Degree or 3 Degree, depending on where they are located in the network. These devices are highly reliable, highly scalable, and adequate to deliver the services required by the CAs and last mile ISPs. As with all components an effort has been made to “value engineer” the appropriate components for the specific site and requirements.

CORE NODES	ROADM		ROADM
	Y/N	Degrees	COST
SPRINGFIELD	Y	2	\$ 154,789.54
GREENFIELD	Y	3	\$ 258,761.30
NORTHAMPTON	Y	2	\$ 154,789.54
PITTSFIELD	Y	2	\$ 154,789.54
HOLYOKE	Y	2	\$ 154,789.54
NORTH ADAMS	N	-	
GREAT BARRINGTON	N	-	
ORANGE	N	-	
WESTFIELD	N	-	
BELCHERTOWN	N	-	
LEE	N	-	



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SANDSFIELD	N	-	
CHARLEMONT	N	-	
HINSDALE	N	-	
WESTMINSTER	Y	2	\$ 154,789.54
PLAINFIELD	N	-	
GOSHEN	N	-	
NEW BRAINTREE	N	-	
RUSSELL	N	-	
BECKET	N	-	
AYER	Y	3	\$ 258,761.30
SAVOY	N	-	
STURBRIDGE	N	-	
BOSTON	Y	3	\$ 258,761.30
TOTAL			\$ 1,550,231.60

An additional 3 ROADMs are required to “light” the UMass MITI IRU, connecting the MassBroadband 123 core network from Ayer to One Summer Street carrier hotel in Boston.

MITI IRU Node	ROADM		ROADM
	Y/N	Degrees	COST
UMass MITI IRU ROADM 1	Y	2	\$ 154,789.54
UMass MITI IRU ROADM 2	Y	2	\$ 154,789.54
UMass MITI IRU ROADM 3	Y	2	\$ 154,789.54
TOTAL			\$ 464,368.62

Line Card and Optics upgrades are required to “light” the NEREN IRU, connecting back to Boston via a diverse path. The costs of these cards is as follows

NEREN IRU			
Description	QTY	UNIT	COST
10 Gigabit Line Card with 2x DWDM Lasers	2	\$ 52,326.00	\$ 104,652.00
TOTAL			\$ 104,652.00

Transport – SONET

In addition to supporting DWDM wavelengths and native Ethernet, the MassBroadband 123 network needs to support full SONET capability, with a focus on offering TDM (DS-1, DS-3, OC-3) and Ethernet over SONET for bandwidth critical applications. The principle driver for this need are timing sensitive Public Safety Radio systems and PBX trunking.



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Each node has been configured with a specific Multiservice Provisioning Platform (MSPP) to provide the proper port requirements for the area served by that node. The MSPP's are interconnected on an OC-48 ring, and can offer OC-3 or OC-12 out to a mini MSPP for network Access

Node	SONET PORTS		SONET
	EoSONET	SONET	MSPP COST
SPRINGFIELD	16	8	\$ 83,272.21
GREENFIELD	12	8	\$ 86,134.75
NORTHAMPTON	8	8	\$ 66,287.81
PITTSFIELD	8	8	\$ 60,362.66
HOLYOKE	8	4	\$ 57,654.02
NORTH ADAMS	4	4	\$ 55,816.45
GREAT BARRINGTON	2	4	\$ 42,556.43
ORANGE	2	4	\$ 54,591.41
WESTFIELD	4	4	\$ 55,816.45
BELCHERTOWN	4	4	\$ 55,816.45
LEE	4	4	\$ 55,816.45
SANDISFIELD	4	4	\$ 55,816.45
CHARLEMONT	4	4	\$ 55,816.45
HINSDALE	4	4	\$ 55,816.45
WESTMINSTER	6	4	\$ 57,654.02
PLAINFIELD	2	4	\$ 42,556.43
GOSHEN	2	4	\$ 42,556.43
NEW BRAINTREE	8	4	\$ 58,879.06
RUSSELL	2	4	\$ 42,556.43
BECKET	2	4	\$ 42,556.43
AYER	4	4	\$ 55,816.45
SAVOY	2	2	\$ 42,556.43
STURBRIDGE	2	1	\$ 41,202.11
BOSTON	16	8	\$ 79,209.25
AVERAGE MSPP			\$ 56,129.90
TOTAL			\$ 1,347,117.48

The MSPP's are "right sized" for each node, based on the number of SONET ports required and the number of Ethernet ports required. The Detailed Project Budget (18.9) uses an average cost per node. The cost difference between nodes is relatively minimal, despite several different port configurations. A detailed configuration / bill of materials has been developed for each MSPP and is available for review.

Access – SONET

MiniMSPP's have been specified for SONET access at CAI 41 locations. Each of the carrier class mini MSPP's support multiple DS-3's and DS-1's.



Mini-MSPP

Description	QTY	UNIT	COST
SONET mini MSPP DS-3 and DS-1	41	\$ 15,894.18	\$ 651,661.23
TOTAL			\$ 651,661.23

Customer Premise Equipment (CPE) (\$485,083)

There are 1392 community anchor institutions that are served by 1064 drops from the network into the customer premise. Mult-customer drops are terminated at single carrier Ethernet switch configured with the number of ports required to meet site requirements. There are 201 multi-customer drops Single customer drops are terminated at a managed media converter providing an Ethernet port. There are 863 single customer drops.

CPE

Description	QTY	UNIT	COST
CAI Carrier Ethernet Switch for multi-tenant CAI Site locations	201	\$ 15,516.00	\$ 304,716.00
CAI Media Converter Optic to RJ45 for single tenant CAI Site Locations	863	\$ 209.00	\$ 180,367.00
TOTAL			\$ 485,083.00

- Provide detailed description, calculation, and basis of evaluation for each Cash Matching Funds source.

The cash matching for this category is based upon prorating the source of cash match (MBI, EOPSS, or ITD) over total cash match for the project (not including the cash match portion attributable to the I-91 costs, which is handled separately in the Construction Category of this Budget Narrative) multiplied by the category total. For this category, the resulting amounts are:

Cash Source 1: MBI funds will be used for 22.6962% of this category, for a total of \$1,598,902.

Cash Source 2: EOPSS funds will be used for 4.6401% of this category, for a total of \$326,889.

Cash Source 3: ITD funds will be used for 4.6401% of this category, for a total of \$326,889.

- Provide detailed description, calculation, and basis of evaluation for each In-Kind Matching Funds source.

None

11. Miscellaneous - \$0



13. Contingencies - \$0

15. Project (program) income - \$0

- The value for this line-item on the SF-424C is \$0. Please do not provide an estimated Project (program income) on the SF-424C.

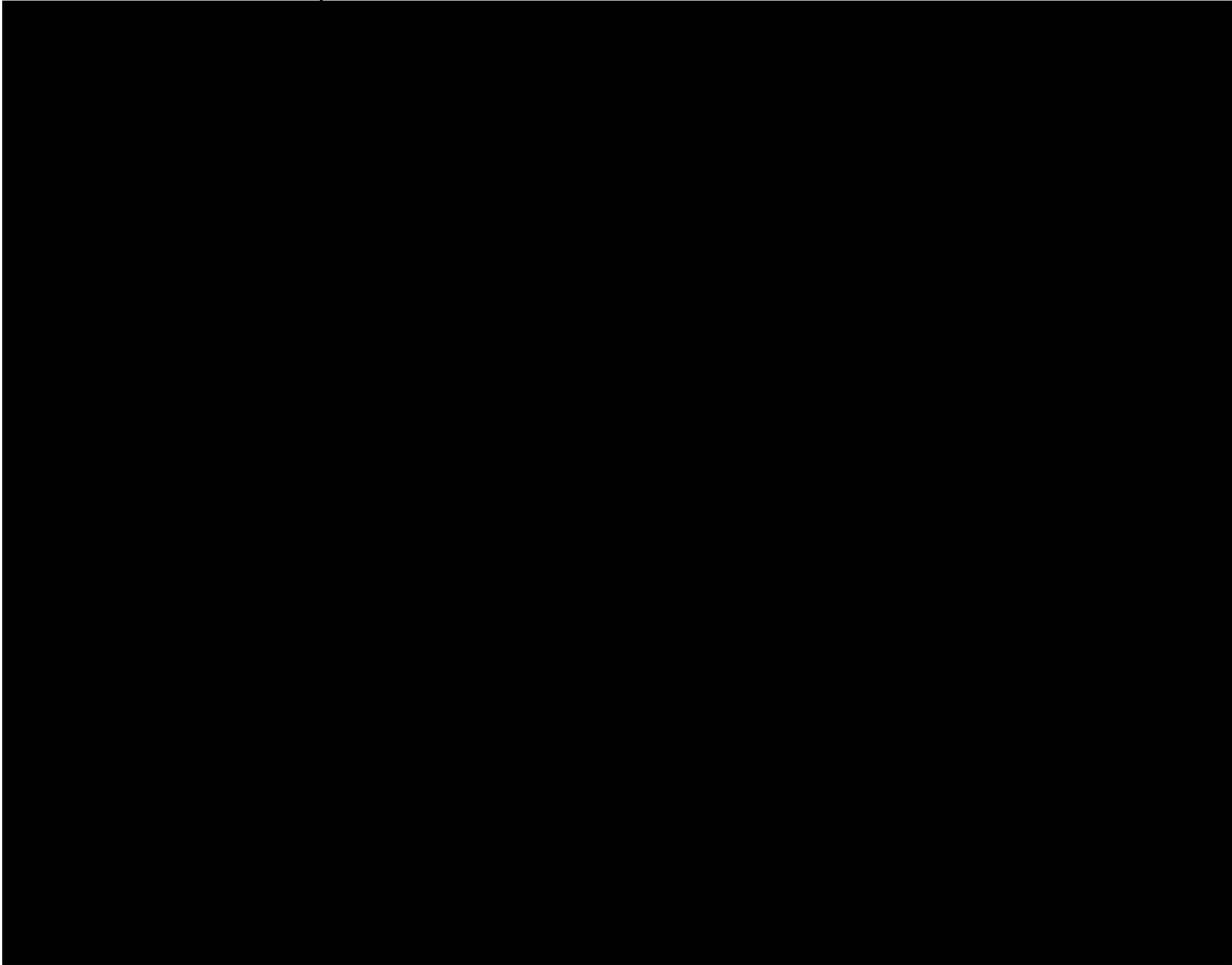
BTOP Comprehensive Community Infrastructure Pro Forma Financial Projections

Please complete the Income Statement, Balance Sheet, Cash Flows, and NPV-IRR Table worksheets. Key assumptions used to formulate these financial projections should be listed in the Key Assumptions worksheet. Please note that these are **project-specific** projections, in contrast to the historical financial information which is provided at the organizational level.

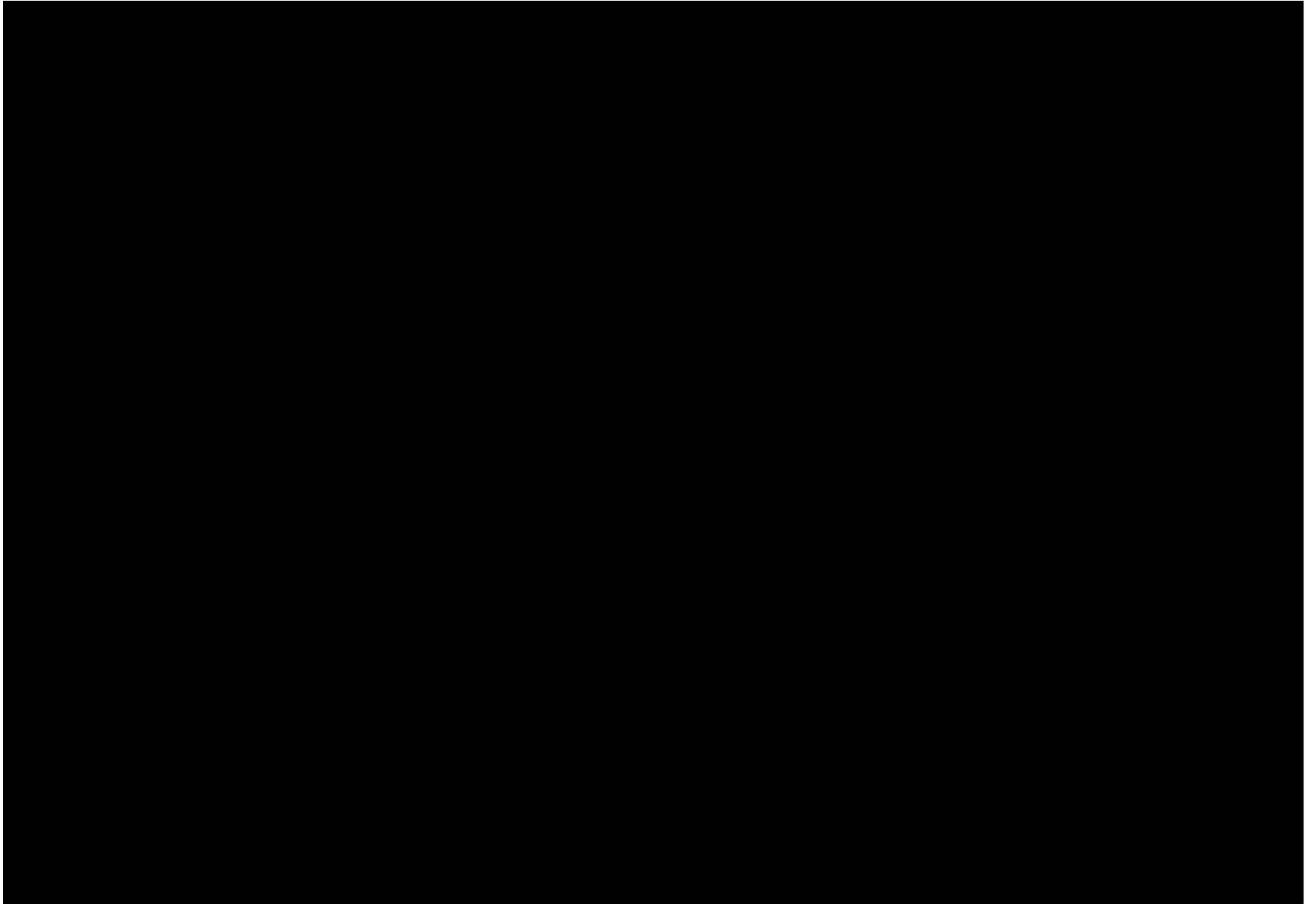
Please refer to the Comprehensive Community Infrastructure Grant Guidance for detailed instructions on the completing this attachment.

Applicants are required to provide this attachment as an Excel file, and not to convert it to a PDF when submitting a copy of their application on an appropriate electronic medium, such as a DVD, CD-ROM, or flash drive. Applicants may make adjustments to the format of the templates as necessary to provide the most effective presentation of the data for their specific project, but should not remove major headings (*e.g.* Revenues and Expenses on the Income Statement) or provide less detailed information than would be required to complete the provided templates.

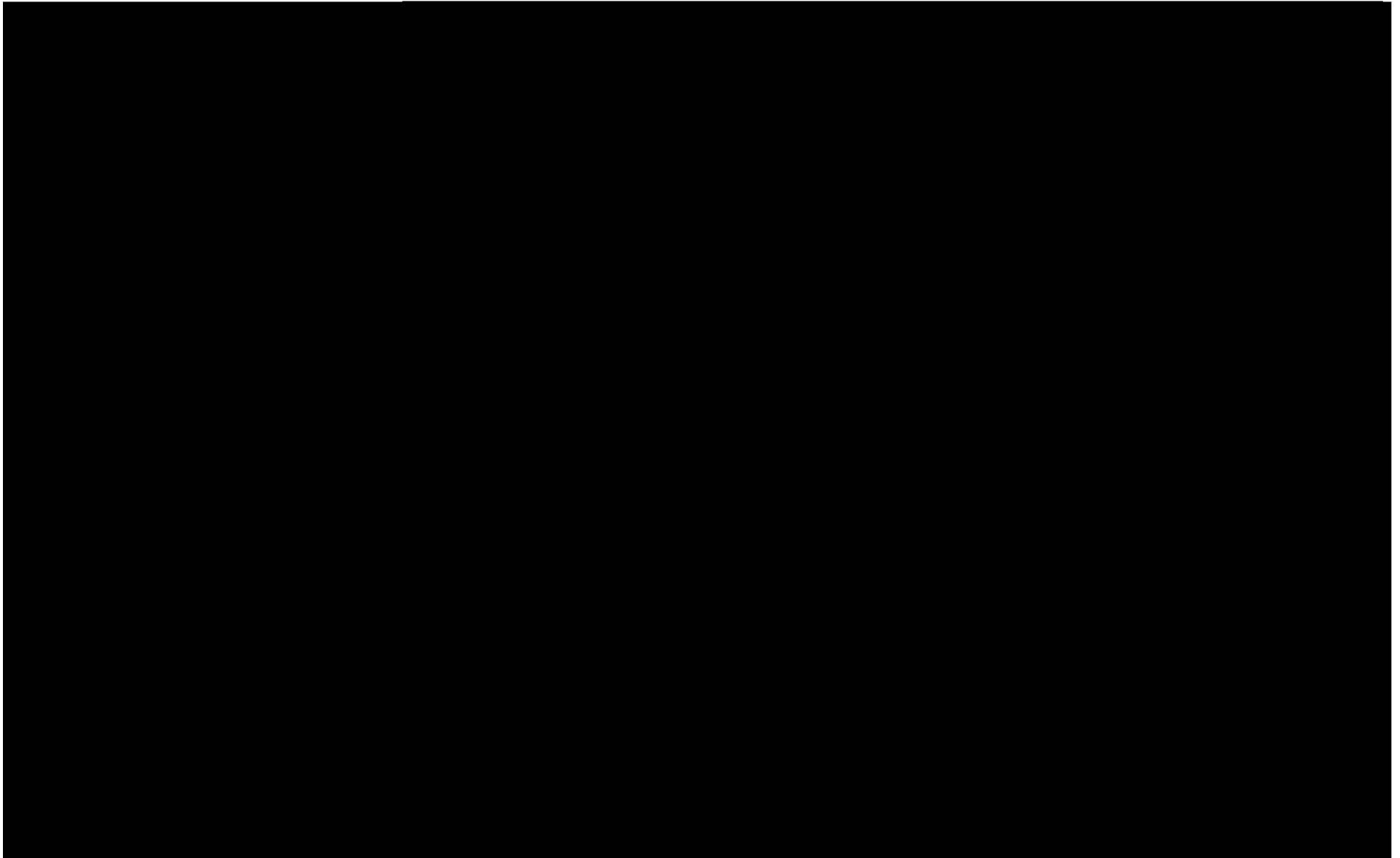
Income Statement



Balance Sheet



Statement of Cash Flows



NPV/IRR Table

	Net Present Value	Internal Rate of Return
Without BTOP Funding		

Revenue Assumptions

We have attached a very detailed word document called Key Assumptions in Supplemental Information which provides substantially more details on the assumptions and data used in our forecasts.

Factor	Specific Metric Used in Analysis	Rationale (Cite Basis)
Customers Passed		
Anchor Institutions - Community		Actual count from state and community government sources. See the Key Assumptions in Supplemental Information for more details.
Anchor Institutions - Public Safety		Actual count from state sources. See the Key Assumptions in Supplemental Information for more details.
Anchor Institutions - Government		Actual count from state and community government sources See the Key Assumptions in Supplemental Information for more details.
Businesses		D&B Marketplace See the Key Assumptions in Supplemental Information for more details.
Households		Census data See the Key Assumptions in Supplemental Information for more details.
Last Mile Providers		Actual count from regional knowledge See the Key Assumptions in Supplemental Information for more details.
Other		
Take Rate (should likely vary across 8-Year Forecast)		
Anchor Institutions - Community		Lower rates for those not directly connected. Higher rates for directly connected locations. Rates vary by year. See the Key Assumptions in Supplemental Information for full details.
Anchor Institutions - Public Safety		Lower rates for those not directly connected. Higher rates for directly connected locations. Rates vary by year. See the Key Assumptions in Supplemental Information for full details.
Anchor Institutions - Government		Lower rates for those not directly connected. Higher rates for directly connected locations. Rates vary by year. See the Key Assumptions in Supplemental Information for full details.
Businesses		No last mile is included for non-CAI businesses in the project, so last mile delivery to businesses will mostly happen after the middle mile is established. Up-take will vary depending on the level of service available in each community, and over time. Adoption estimates recognize time required for providers to build-out connections post grant completion. See the Key Assumptions in Supplemental Information for more details.
Households		No last mile is included in the project, so last mile delivery to consumers will happen after the middle mile is established. Up-take will vary depending on the level of service available in each community, and over time. Low total is due in part to provider required build-out post grant completion. See the Key Assumptions in Supplemental Information for more details.
Last Mile Providers		See the Key Assumptions in Supplemental Information page 19 for more details. Based on direct expression of intent.
Direct Customer Connections		
Anchor Institutions - Community		Built up by project team based on network roll-out and demand forecasts. See the Key Assumptions in Supplemental Information for more details on methodology.
Anchor Institutions - Public Safety		Built up by project team based on network roll-out and demand forecasts. See the Key Assumptions in Supplemental Information for more details on methodology.
Anchor Institutions - Government		Built up by project team based on network roll-out and demand forecasts. See the Key Assumptions in Supplemental Information for more details on methodology.

Other		
Average Revenue per User (may vary across 8-year forecast)		
Anchor Institutions - Community		Monthly. Varies by type of CAI and bandwidth needed. See section 1.5.3 in the Key Assumptions in Supplemental Information.
Anchor Institutions - Public Safety		Monthly. Varies by type of CAI and bandwidth needed. See section 1.5.3 in the Key Assumptions in Supplemental Information.
Anchor Institutions - Government		Monthly. Varies by type of CAI and bandwidth needed. See section 1.5.3 in the Key Assumptions in Supplemental Information.
Businesses		All businesses served via wholesale to ISP Last Mile Providers. See the Key Assumptions in Supplemental Information.
Households		All consumers served via wholesale to ISP Last Mile Providers. See the Key Assumptions in Supplemental Information.
Last Mile Providers		Monthly wholesale prices. Revenues based on indirect sales uptake of number of businesses and consumers by type of circuit likely acquired. See the Key Assumptions in Supplemental Information.
Other		

Expense Assumptions

Factor	Specific Metric Used in Analysis	Rationale (Cite Basis)
Network Expenses		
Backhaul	N/A	Network directly connected to iPOP. ISPs will bear backhaul expenses
Maintenance	\$1,018,959 - \$1,959,806	Annual network maintenance and monitoring including pole and conduit leases and break/fix. See the Key Assumptions in Supplemental Information.
Utilities	\$27,386 - \$53,737	Annual utilities and propane for generators for network active equipment locations. See the Key Assumptions in Supplemental Information.
Leasing	\$5,000 - \$75,900	Annual leasing for trucks, office space, etc.
Depreciation	\$155,568 - \$4,964,973	Annual depreciation on capital assets consisting of fiber, equipment and IRUs
Police Details	\$28,080 - \$66,000	Annual police details for fiber maintenance and extension
Other	\$49,552 - \$363,647	Annual colocation and access costs
Sales & Marketing		
Sales & Marketing	\$30,670 - \$67,421	Annual Sales and Marketing. Number is low because of the indirect nature where target market is only the ISPs. See Key Assumptions in Supplemental Information.
Other		
Customer Care & Billing		
Systems	N/A	Non-project contribution of network operator's existing system.
Customer Care	\$146,251 - \$232,842	Annual costs for personnel for billing and customer care for ISPs.

Billing	\$12,500 - \$25,000	Annual costs for monthly billing for ISP customers.
Other		
General & Administrative		
Total	\$402,226 - \$1,185,402	Annual. For a detailed breakdown of the key assumptions used in determining G&A and all expenses, please see the Key Assumptions in Supplemental Information.
Interest Expenses		
Debt Instrument A	N/A	
Debt Instrument B	N/A	
Taxes		
Federal Tax Rate	N/A	
Other Tax Rates	N/A	