






Requirements for 911 Communications Dispatch Center

December 16, 2019



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Agenda

- ✧ Accomplishments
- ✧ Radio System
 - Assessment
 - Analysis
 - Alternatives
 - Conceptual Design
- ✧ Dispatch Center
 - Assessment
 - Analysis
 - Alternatives
 - Conceptual Design
- ✧ Opinion of Probable Costs
- ✧ Recommendations




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Accomplishments

Initialization Meeting

Assessment

- Documentation Review / Interviews
- Site / Dispatch Center Surveys
- Current User Issues
- Ranking of Attributes

Analysis

- Frequency
- Coverage
- Traffic Loading
- Interoperability
- Backhaul Connectivity

Alternatives

- Radio System
- 911 Dispatch Center
- Impact Analysis
- Alternatives Meeting

Recommendations

- Plan for the Future
- Short-term Strategies
- Long-term Strategies

Draft Report

Final Report



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Radio System



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Assessment - Current Radio Systems

☞ Milford Area Communications Center (MACC) Base

- 5-site, 4-channel analog VHF radio system
 - ▷ Law Enforcement – Law Enforcement Agencies for Milford, Wilton, Mont Vernon, and Lyndeborough
 - ▷ Fire – Wilton Fire Department
 - ▷ Ambulance – Milford and Wilton Ambulances
- 2-site, 1-channel analog VHF low-band radio system - DPW
- 4-site VHF low-band paging system
 - ▷ VHF Public Works –Milford, Wilton, Mont Vernon, and Lyndeborough
 - ▷ VHF Fire – Wilton and Mont Vernon

☞ Milford Fire Department

- 1-site, 1-channel, analog VHF radio system



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Assessment - Current User Issues

☞ Lack of Coverage

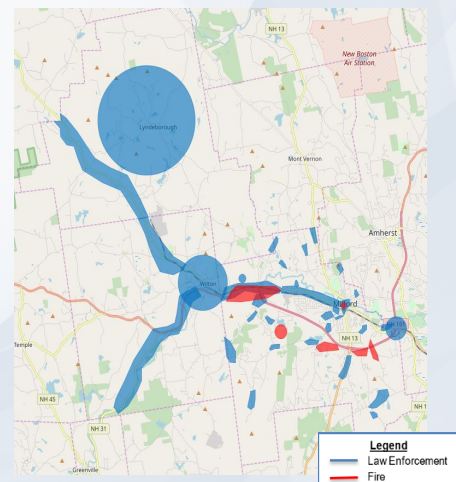
- Mobile
- Portable Outdoors
- In-Building
- Pagers

☞ Inability to hear and be heard by dispatch

☞ Lack of Capacity

☞ Lack of Interoperability

☞ Aging Equipment



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Assessment - Interoperability

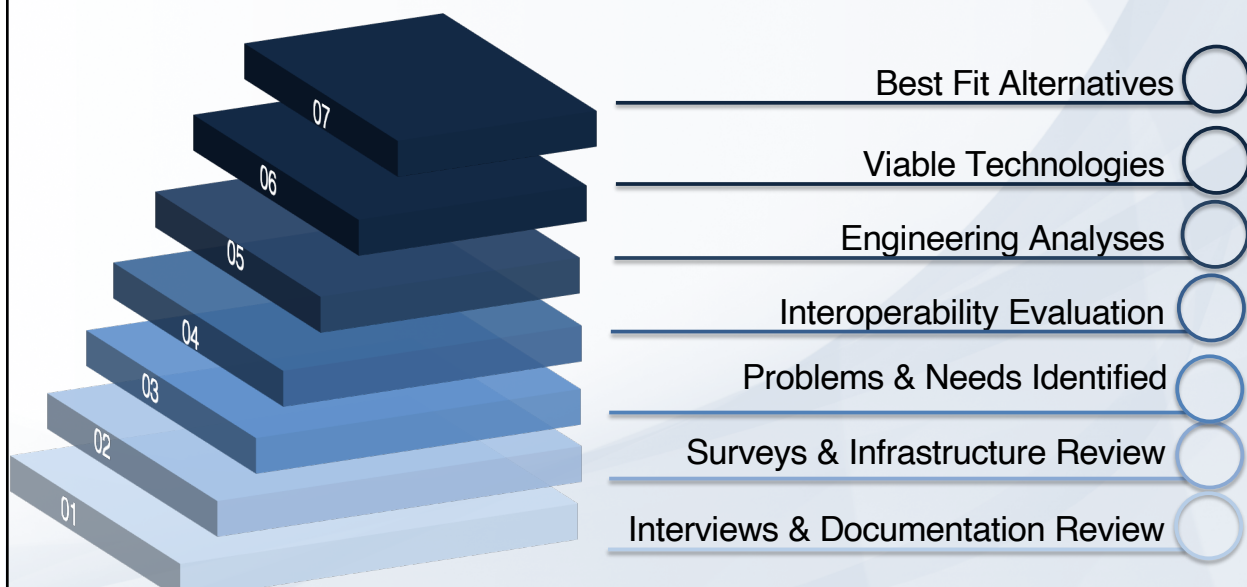
Interoperability is critical

- ☞ Within Milford, Wilton, Mont Vernon, & Lyndeborough
- ☞ Between Agencies within the Towns
- ☞ Between Agencies outside the Towns
 - Amherst
 - Greenfield
 - Hillsborough County
 - Manchester
 - Nashua
 - New Boston
 - Hospitals
 - Schools
 - Keene Mutual Aid
 - State Police
 - Temple



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Basis of Alternatives



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Radio System Alternatives

- ✿ Milford Standalone VHF P25 Conventional System
- ✿ Milford Standalone 700/800 MHz P25 Conventional System
- ✿ Regional VHF Simulcast P25 Conventional System
 - Analog Infrastructure
 - Subscribers / Convert to Digital
- ✿ Regional 700/800 MHz Simulcast P25 Conventional System

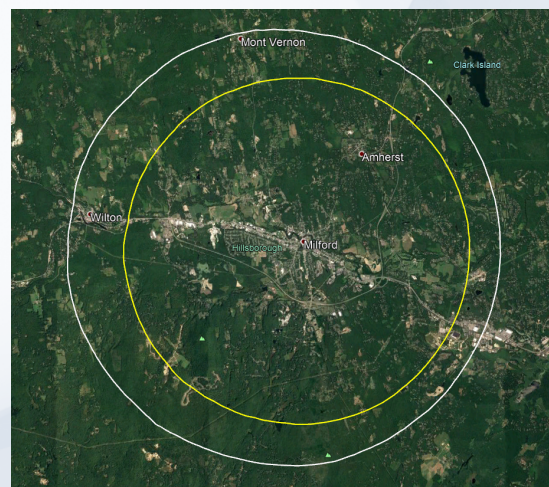


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Alternatives – Milford Coverage

- ✿ Town of Milford:
 - 95% portable outdoor coverage
 - 1 site VHF w/DVRS
 - 1 site 700/800 MHz

Note: White Circles VHF
Yellow Circles 700/800 MHz



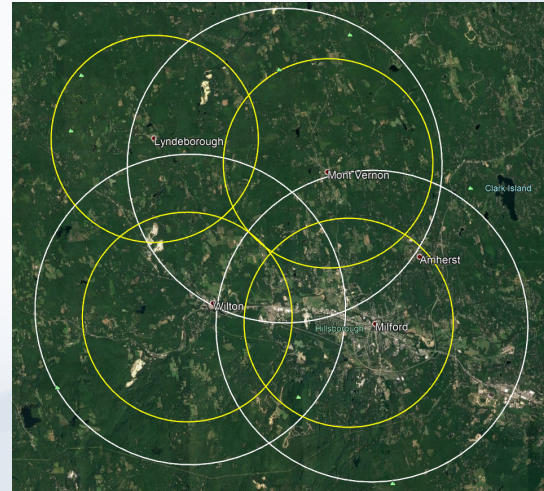
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Alternatives – Regional Coverage

Regional System:

- 95% portable outdoor coverage
- 3 sites VHF w/DVRS
- 4 sites 700/800 MHz

Note: White Circles VHF
Yellow Circles 700/800 MHz



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Alternatives - Capacity

Assumptions:

- P25 Phase 1 Analog/Digital
- Conventional Operation

Milford Standalone System:

- 4 channels

Regional System:

- 4 channels
- Simulcast technology required



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Alternatives - Interoperability

Agencies	Milford Police	Milford Fire	Milford Ambulance	Milford DPW	Milford Water Utilities	Mont Vernon Police	Mont Vernon Fire	Mont Vernon Public Works	Wilton Police	Wilton Fire	Wilton Ambulance	Lyndeborough Police	MACC Base
Milford Police			x						X			X	
Milford Fire	N		x	x	x		x		x	x		x	X
Milford Ambulance	N								x	x	x		
Milford DPW	N	x	N		x	x	x		x	x			X
Milford Water Utilities	N		N										
Mont Vernon Police	X	x	x	x			N	N	X	x	x	X	X
Mont Vernon Fire			N										
Mont Vernon Public Works	x	x	N										x
Wilton Police	X	x	x			X	x			x	x	X	X
Wilton Fire		x	x				X		X			x	X
Wilton Ambulance	X		x	x					x	x		X	x
Lyndeborough Police			x						X				
MACC Base	X		X						X			X	



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Advantages / Disadvantages

	Town of Milford VHF P25 Conventional	Town of Milford 700/800 MHz P25 Conventional	Regional VHF Simulcast P25 Conventional	Regional 700/800 MHz Simulcast P25 Conventional
Operability				
Interoperability				
System Maintenance				
Operational Changes				
Changes				
Coverage - Outdoor				
Coverage - Indoor				
Capacity				
Simulcast				
Frequency Availability				
Potential Reuse of Subscribers				
Shared / Infrastructure Costs				
Subscriber Replacement/Costs				
Sustainability				



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Alternatives Ranking Matrix - Milford

Report Section	ATTRIBUTE	Town of Milford Only Weight Factor	Town of Milford VHF System		Town of Milford 700/800 System	
			AVG	Score	AVG	Score
4.2.1.a	Coverage - Mobile	5.0	5.0	25.0	4.3	21.3
4.2.1.b	Coverage - Portable Outdoors	5.0	4.0	20.0	4.5	22.5
4.2.1.c	Coverage - Portable Inside Buildings	5.0	2.8	13.8	4.5	22.5
4.2.3	Flexibility in Talk Group Structure	5.0	4.8	23.8	3.8	18.8
4.2.4	Survivability	5.0	4.3	21.3	4.3	21.3
4.2.5	Redundant Core Equipment	4.3	4.8	20.6	4.8	20.6
4.2.6	Capacity	3.3	4.3	14.2	5.0	16.7
4.2.7	Infrastructure Scalability	4.7	4.0	18.7	3.8	17.5
4.2.8	Relieve Internal Congestion	4.7	4.0	18.7	4.3	19.8
4.2.9	Interoperability	4.0	5.0	20.0	1.0	4.0
4.2.10	Mobile Data	4.0	4.3	17.0	4.3	17.0
4.2.11	No Interference	3.3	2.5	8.3	4.5	15.0
4.2.12	Maintainability	4.3	4.3	18.4	4.3	18.4
4.2.13	Reliability	3.7	4.3	15.6	4.5	16.5
4.2.14	System Operational Transparency	4.0	4.5	18.0	4.5	18.0
4.2.15	Emergency Access	4.0	5.0	20.0	4.8	19.0
4.2.16	Encryption	4.7	5.0	23.3	5.0	23.3
4.2.17	Security (Physical and Software)	4.0	4.3	17.0	4.3	17.0
4.2.18	Initial Cost	4.0	2.8	11.0	2.8	11.0
4.2.19	Long-Term Cost	3.0	3.3	9.8	2.0	6.0
4.2.20	Cost Effectiveness	4.7	2.8	12.8	3.8	17.5
4.2.21	Competitive Procurement	4.0	5.0	20.0	5.0	20.0
4.2.22	Operational Boundary Flexibility	4.3	5.0	21.7	2.8	11.9
4.2.23	Commonality of Equipment	4.0	4.3	17.0	3.3	13.0
4.2.24	Alarms & Monitoring	3.7	4.3	15.6	4.5	16.5
4.2.25	Training	4.3	4.0	17.3	4.5	19.5
4.2.27	Additional Subscriber Features	4.0	3.8	15.0	3.3	13.0



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Alternatives Ranking Matrix – All Towns

Report Section	ATTRIBUTE	All Towns Weight Factor	Regional VHF System		Regional 700/800 System	
			AVG	Score	AVG	Score
4.2.1.a	Coverage - Mobile	5.0	5.0	25.0	4.0	20.0
4.2.1.b	Coverage - Portable Outdoors	5.0	4.0	20.0	4.3	21.3
4.2.1.c	Coverage - Portable Inside Buildings	5.0	2.8	13.8	4.5	22.5
4.2.3	Flexibility in Talk Group Structure	4.0	5.0	20.0	3.8	18.8
4.2.4	Survivability	4.7	4.5	21.2	4.3	21.3
4.2.5	Redundant Core Equipment	4.4	4.8	21.0	4.8	20.6
4.2.6	Capacity	4.0	4.3	17.0	5.0	16.7
4.2.7	Infrastructure Scalability	4.0	4.0	16.0	3.8	17.5
4.2.8	Relieve Internal Congestion	3.4	4.0	13.7	4.3	19.8
4.2.9	Interoperability	4.7	5.0	23.6	1.0	4.0
4.2.10	Mobile Data	4.1	4.3	17.6	4.3	17.0
4.2.11	No Interference	4.1	2.5	10.4	4.5	15.0
4.2.12	Maintainability	4.1	4.3	17.6	4.3	18.4
4.2.13	Reliability	4.4	4.3	18.8	4.5	16.5
4.2.14	System Operational Transparency	3.7	4.5	16.7	4.5	18.0
4.2.15	Emergency Access	4.0	5.0	20.0	4.8	19.0
4.2.16	Encryption	3.3	5.0	16.4	5.0	23.3
4.2.17	Security (Physical and Software)	4.4	4.3	18.8	4.3	17.0
4.2.18	Initial Cost	3.7	2.5	9.3	2.5	10.0
4.2.19	Long-Term Cost	3.9	4.0	15.4	2.5	7.5
4.2.20	Cost Effectiveness	3.7	2.8	10.1	3.8	17.5
4.2.21	Competitive Procurement	3.9	5.0	19.3	5.0	20.0
4.2.22	Operational Boundary Flexibility	4.0	5.0	20.0	2.8	11.9
4.2.23	Commonality of Equipment	3.7	5.0	18.6	3.3	13.0
4.2.24	Alarms & Monitoring	4.0	4.3	17.0	4.5	16.5
4.2.25	Training	4.1	4.0	16.6	4.5	19.5
4.2.27	Additional Subscriber Features	3.7	3.8	13.9	3.0	12.0



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Alternatives Ranking - Results





ATTRIBUTE	Milford VHF System	Milford 700/800 System	Regional VHF System	Regional 700/800 System
	Milford Only Weight Factor		All Towns Weight Factor	
Average Score	474	458	468	455
ROM Costs	\$ 2,152,800.00	\$ 2,146,700.00	\$ 4,714,200.00	\$ 4,516,800.00
RANKING	1	3	2	4



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Recommended Alternative

It is CTA's opinion that a VHF P25 Phase 1 Conventional Radio System is the BEST FIT for Milford, as it provides the needed:

-  Coverage
-  Capacity
-  Interoperability
-  Cost Savings – can be lower if the AT&T new tower construction is approved

. . . for all public safety and public works users!



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Recommended Alternative

*If the Towns of Wilton, Mont Vernon, and Lyndeborough desire to upgrade their radio systems, we recommend a **Regional VHF Simulcast P25 Phase 1 Conventional Radio System** as the **BEST FIT**, as it provides the needed:*

- 🌀 Coverage
- 🌀 Capacity
- 🌀 Interoperability
- 🌀 Cost Savings

. . . for all public safety and public works users!



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Conceptual Design – Milford

🌀 Architecture:

- 1-site, 4-channels, P25 Phase 1, conventional radio system
- Negotiate/Utilize AT&T Tower at Milford Police Department

🌀 Capacity:

- 4 conventional channels (8 total VHF frequencies)

🌀 Interoperability:

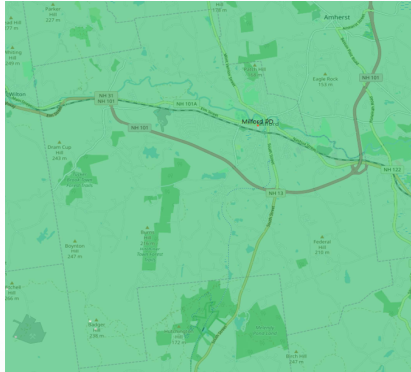
- interoperability gateway equipment



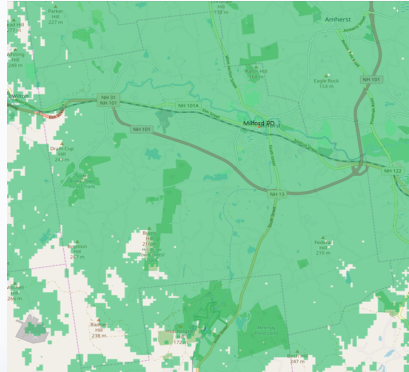
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Conceptual Design – Milford

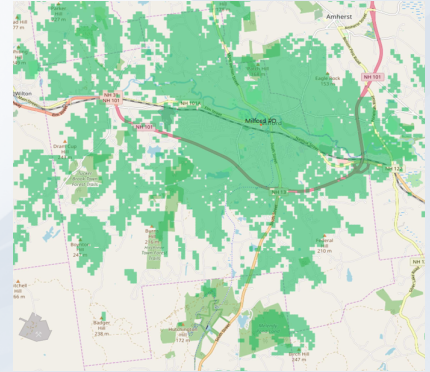
Coverage:



Mobile Conceptual Coverage



Portable Outdoor Conceptual Coverage



Portable In Building Conceptual Coverage



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Conceptual Design – Regional

Architecture:

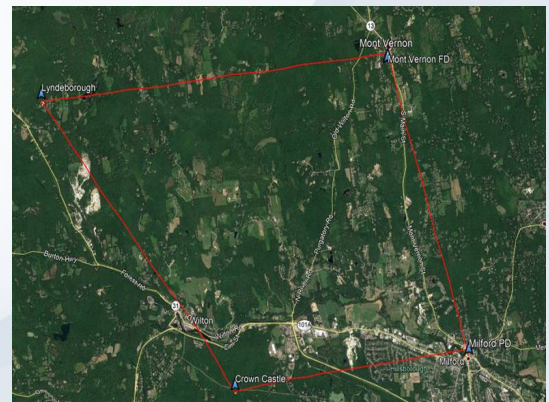
- 4-sites, 4-channels, P25 Phase 1, conventional radio system
- MW ring topology

Capacity:

- 4 conventional channels (8 total VHF frequencies)

Interoperability:

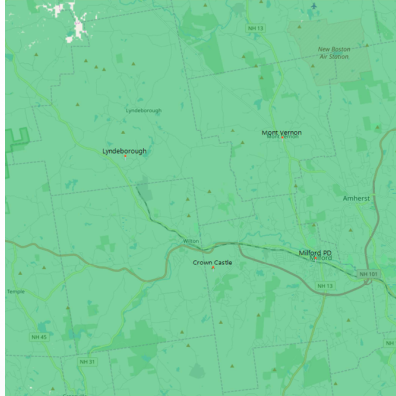
- interoperability gateway equipment



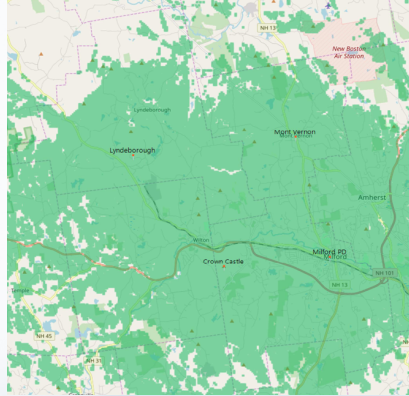
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Conceptual Design - Regional

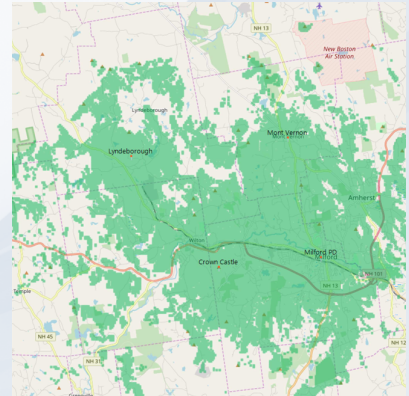
Coverage:



Mobile Conceptual Coverage



Portable Outdoor Conceptual Coverage



Portable In Building Conceptual Coverage



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Dispatch Center



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Assessment - Current Operations

- ❧ Milford Area Communications Center (MACC) Base Dispatches 9-1-1 calls for:
 - Ambulance: Milford and Wilton
 - Fire: Milford, Wilton, and Mont Vernon
 - Law Enforcement: Milford, Wilton, Mont Vernon, and Lyndeborough
- ❧ Secondary PSAP for 911 calls for all 4 towns
- ❧ Operations
 - 5 full time positions and 6 part time positions
 - 2 dispatchers 16 hours per day / 1 dispatcher 8 hours per day



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Assessment - Current Issues

- ❧ Inability to hear and be heard by users
- ❧ Site security
- ❧ No monitoring / alarms
- ❧ Aging Equipment
- ❧ Inconsistent dispatcher performance
- ❧ Lack of Funding
- ❧ Politics



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Assessment - Location



MACC Base - Milford Town Hall

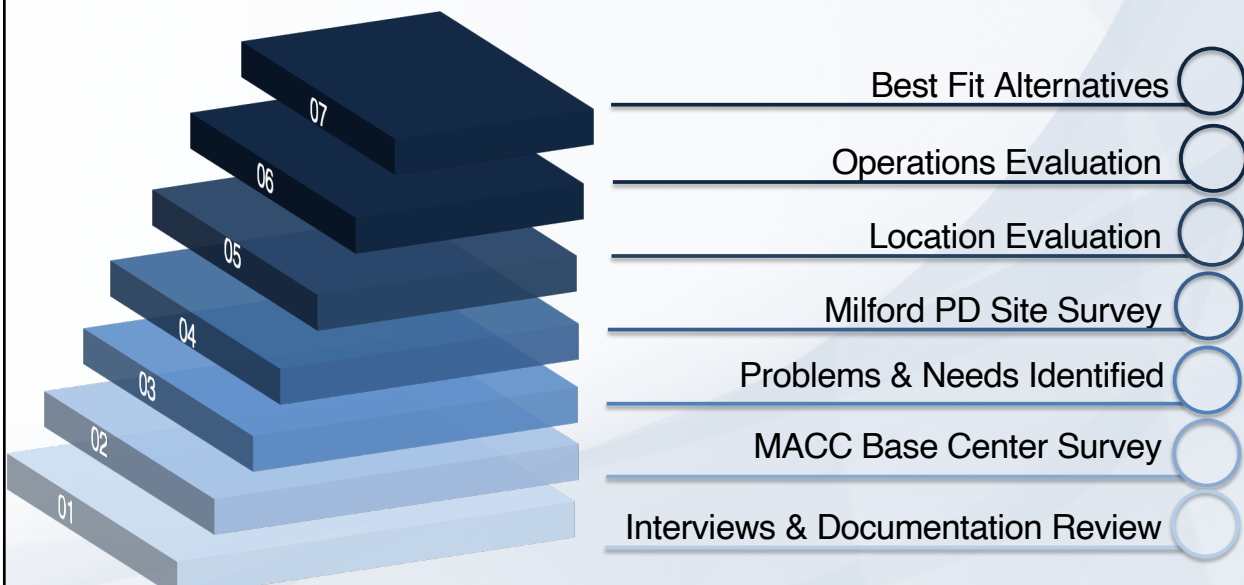


Milford Police Department



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Basis of Alternatives



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Alternatives - Considerations

Location:

- MACC Base or MPD
 - ▷ Space
 - ▷ Security
 - ▷ NFPA 1221
 - ▷ Backhaul
 - ▷ Redundancy
 - ▷ Consoles
 - ▷ Technology

Operations:

- Town or Regional
 - ▷ Operations Committee
 - ▷ Policies & Procedures
 - ▷ Operations Standards
 - ▷ Training
 - ▷ Financial Advisory Committee
 - ▷ Legal / Human Resources
 - ▷ Operating Budget
 - ▷ Capital Budget



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Dispatch Center Alternatives

- ❧ MACC Base Dispatch Center Location and Operations
- ❧ Milford Police Department Location and Town of Milford – only Operations
- ❧ Milford Police Department Location and Regional Operations



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Advantages / Disadvantages

	MACC Base Location and Operations	PD Location and Town of Milford Only Operations	PD Location and Town of Milford Regional Operations
Radio System Connectivity			
Facility Security			
Personnel Backup			
Infrastructure Costs			
Operational Costs			
Operational Transition			
Sustainability - Cost Effective			



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Alternatives Ranking Matrix - Milford

Report Section	ATTRIBUTE	Town of Milford Only Weight Factor	MACC Base Location and Operations		Milford PD Location and Town of Milford Only Operations		Milford PD Location and Town of Milford Regional Operations	
			AVG	Score	AVG	Score	AVG	Score
4.2.2	Dispatch Operational Concept	5.0	3.3	16.3	4.0	20.0	4.0	20.0
4.2.18	Initial Cost	4.0	2.5	10.0	4.8	19.0	3.5	14.0
4.2.19	Long-Term Cost	3.0	1.8	5.3	4.3	12.8	4.3	12.8
4.2.20	Cost Effectiveness	4.7	2.0	9.3	3.3	15.2	4.3	19.8
4.2.21	Competitive Procurement	4.0	3.5	14.0	4.8	19.0	4.8	19.0
4.2.24	Alarms & Monitoring	3.7	3.5	12.8	4.8	17.4	4.5	16.5
4.2.25	Training	4.3	3.5	15.2	4.5	19.5	4.5	19.5
4.2.26	Console Features	4.0	4.0	16.0	5.0	20.0	5.0	20.0



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Alternatives Ranking Matrix – All Towns

Report Section	ATTRIBUTE	All Towns Weight Factor	MACC Base Location and Operations		Milford PD Location and Town of Milford Regional Operations	
			AVG	Score	AVG	Score
4.2.2	Dispatch Operational Concept	4.4	3.3	14.4	4.0	17.7
4.2.18	Initial Cost	3.7	2.5	9.3	3.5	13.0
4.2.19	Long-Term Cost	3.9	1.8	6.8	4.3	16.4
4.2.20	Cost Effectiveness	3.7	2.0	7.3	4.3	15.6
4.2.21	Competitive Procurement	3.9	3.5	13.5	4.8	18.3
4.2.24	Alarms & Monitoring	4.0	3.5	14.0	4.5	18.0
4.2.25	Training	4.1	3.5	14.5	4.5	18.6
4.2.26	Console Features	3.4	4.0	13.7	5.0	17.1



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Alternatives Ranking - Results

	MACC Base Location and Operations	PD Location and Town of Milford Only Operations	PD Location and Town of Milford Regional Operations	MACC Base Location and Operations	PD Location and Town of Milford Regional Operations
	Milford Only Weight Factor			All Towns Weight Factor	
Average Score	99	143	142	93	135
ROM Costs	\$ 1,660,000	\$ 1,300,000	\$ 1,400,000	\$ 1,660,000	\$ 1,400,000
RANKING	3	1	2	2	1

Integrated Ranking **4** **1** **2** **5** **3**



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Recommended Alternative

*It is CTA's opinion that a **Milford Police Department Location and Town of Milford-only Operations** is the **BEST FIT** for the Town of Milford.*

- ⌘ Public Safety Grade Dispatch Facility
- ⌘ **Town** Operations provide Cost / Operational Improvements
- ⌘ Initial & Long-Term Costs lower
- ⌘ Increased services to the citizens of Milford

... for all public safety and public works users!



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Recommended Alternative

*If the Towns of Wilton, Mont Vernon, and Lyndeborough desire to upgrade their operational environment, we recommend a **Milford Police Department Location and Town of Milford Regional Operations** as the **BEST FIT**, as it provides the needed:*

- ⌘ Public Safety Grade Dispatch Facility
- ⌘ Dispatching Services Costs lower
- ⌘ **Town** Operations provide Cost / Operational Improvements

... for all public safety and public works users!

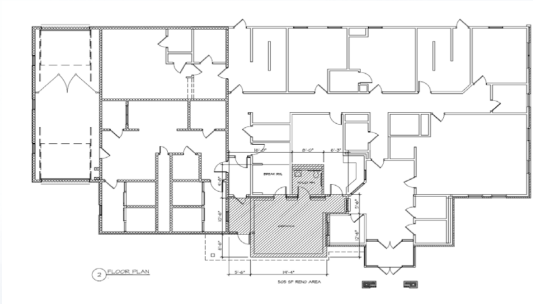


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Conceptual Design – Milford

Location / Facility

- Milford Police Department
- Following NFPA 1221 Guidelines



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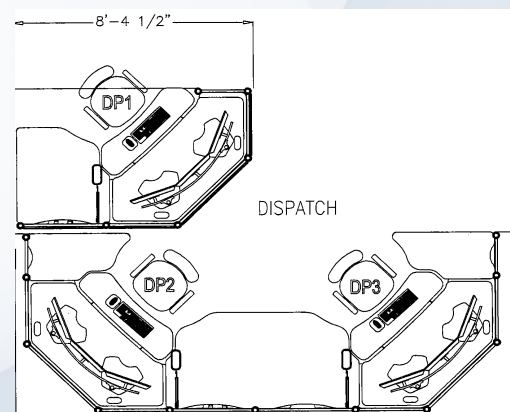
Conceptual Design – Milford

Dispatch Technology

- IP Consoles
- CAD Software
- Logging Recorder

Dispatch Staffing

- 24/7/365
- 2 shifts (20 hours) 2 dispatchers
- 1 shift (4 hours) 1 dispatcher
 - Protocols will be established for routine checks on single dispatcher



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Conceptual Design – Operations

Town of Milford-only Operations

- Governance Committee representation from each Agency
- Operations Sub-Committee: *representative from each agency* responsible for approving specific operating guidelines
- Financial Advisory Committee: Town representative from each agency responsible for approving final operating and capital budgets

Town of Milford – Regional Operations

- Operations Sub-Committee: *representative from each agency in each participating Town*



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Opinion of Probable Costs



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Opinion of Probable Costs - Milford

Cost Elements	List Estimate	Negotiated Estimate	Competitive Estimate
RADIO INFRASTRUCTURE	\$ 299,500	\$ 299,500	\$ 299,500
MICROWAVE SYSTEM	\$ -	\$ -	\$ -
PHYSICAL FACILITIES	\$ 416,800	\$ 375,100	\$ 375,100
SUBSCRIBERS	\$ 717,800	\$ 610,100	\$ 538,400
PAGING SYSTEM & PAGERS	\$ 57,100	\$ 48,500	\$ 42,800
VENDOR SERVICES	\$ 282,700	\$ 268,600	\$ 254,400
DISCOUNT	\$ -	\$ (237,000)	\$ (445,700)
SPARES - SUBSCRIBERS	\$ 14,100	\$ 12,000	\$ 10,600
SPARES - FIXED NETWORK	\$ 34,100	\$ 30,700	\$ 29,000
SPARES - DISPATCH	\$ 20,000	\$ 18,000	\$ 18,000
CONSULTING	\$ 367,300	\$ 367,300	\$ 367,300
CONTINGENCY	\$ 219,000	\$ 197,100	\$ 186,200
RADIO INFRASTRUCTURE TOTAL - not using AT&T Tower	\$ 2,428,400	\$ 1,989,900	\$ 1,675,600
RADIO INFRASTRUCTURE TOTAL - using AT&T Tower	\$ 2,103,400	\$ 1,664,900	\$ 1,350,600
DISPATCH CENTER - FACILITY	\$ 500,000	\$ 450,000	\$ 400,000
DISPATCH CENTER - CONSOLES/LOGGING/CAD	\$ 318,500	\$ 318,500	\$ 318,500
DISPATCH INFRASTRUCTURE TOTAL	\$ 818,500	\$ 768,500	\$ 718,500
INFRASTRUCTURE TOTAL	\$ 2,921,900	\$ 2,433,400	\$ 2,069,100
DISPATCH - OPERATIONS	\$ 550,000	\$ 550,000	\$ 550,000
PROJECT TOTAL	\$ 3,471,900	\$ 2,983,400	\$ 2,619,100



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Opinion of Probable Costs - Regional

	Town of Milford	Town of Wilton	Town of Mont Vernon	Town of Lyndeborough	TOTALS
Radio System Infrastructure	\$ 1,411,400	\$ 938,800	\$ 870,300	\$ 738,500	\$ 3,959,000
Radio System Infrastructure %	35.7%	23.7%	22.0%	18.7%	100.0%
Dispatch Infrastructure	\$ 654,800	\$ -	\$ -	\$ -	\$ 654,800.00
INFRASTRUCTURE TOTAL	\$ 2,066,200	\$ 938,800	\$ 870,300	\$ 738,500	\$ 4,613,800
Recommended Dispatch Operations	\$ 471,250	\$ 97,500	\$ 65,000	\$ 16,250	\$ 650,000
Dispatch Operations %	72.5%	15.0%	10.0%	2.5%	100.0%
Current Dispatch MACC Base	\$ 527,546	\$ 128,316	\$ 84,064	\$ 22,000	\$ 761,926
Difference	\$ (56,296)	\$ (30,816)	\$ (19,064)	\$ (5,750)	\$ (111,926)



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Recommendations



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Radio System

- ❧ CTA recommends the Town of Milford procure and install a ***single site, 4-channel, P25 Phase 1, conventional radio system.***
- ❧ The new configuration will operate in the VHF public safety band and take full advantage of existing licensed frequencies.
- ❧ The planned AT&T tower at the Milford Police Department will provide adequate radio coverage for the Town of Milford.



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Dispatch Center

- ❧ New dispatch center at Milford Police Department
- ❧ Dispatch Center that can accommodate the Town of Milford as well as the towns of Wilton, Mont Vernon, and Lyndeborough
- ❧ Operations under the control of the Town of Milford
- ❧ Establish a Governance Committee
 - Operations Sub-Committee
 - Finance Sub-Committee



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Why Plan for the Future

Current communications environment is inefficient at best and life-threatening at worst.

- ❧ Improve Operability
 - Simplified communications
 - Communicate **when** and **where** needed
 - Consistently dependable systems
- ❧ Improve Interoperability
- ❧ Protect the lives of those who serve the citizens of Milford

The time is NOW for the Town of Milford to upgrade your public safety communications!



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