



TOWN OF MILFORD, NH
OFFICE OF COMMUNITY DEVELOPMENT

1 UNION SQUARE, MILFORD, NH 03055

TEL: (603)249-0620

WEB: WWW.MILFORD.NH.GOV

Date: August 5, 2020
To: Board of Selectmen
John Shannon, Town Administrator
From: Lincoln Daley, Community Development Director
Subject: Milford Memorial Committee -Vietnam Memorial

The Milford Memorial Committee is before the Board to provide an update on the status of the Vietnam Memorial project and seek approval of the proposed location and design. In addition, in an effort to reduce the costs for materials, the Committee is seeking approval to utilize granite material from the Souhegan Street Town owned storage area and granite material donated by the owners of the former Tonella Quarry. Said material will be used for the construction of benches, base/platform, and a 40' decorative retaining wall. Attached, please find a brief presentation summarizing the location and project design details.

PRESENTATION OUTLINE

- Summary Of The Process To Date
- Approval Of Vietnam Memorial Location
- Approval Conceptual Memorial Design
- Appropriation Of Town Material / Acceptance Of Donated Material For Memorial
- Next Steps.

Milford Memorial Committee

- Formed in 2017, the Committee is comprised of Veterans, Town staff and officials, Recreation Commission, and vested residents.
- Committee's purpose is to present to the Board of Selectmen a design and location of a Vietnam War Memorial.
- Raise money for the construction of the project.
- The project has been expanded to include the design for a potential future second memorial, the Freedom Memorial.

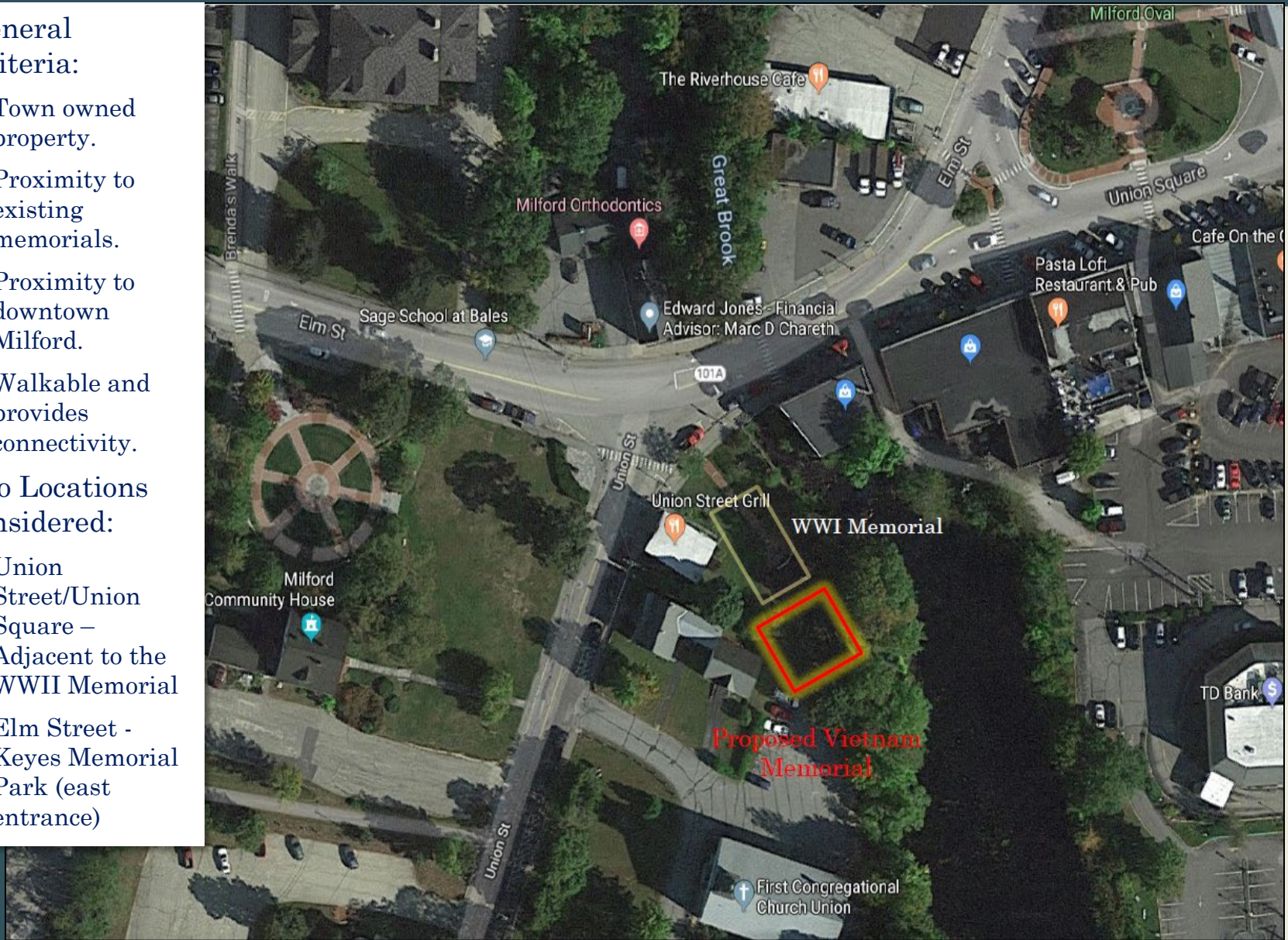
Vietnam Memorial – Preferred Location

- General Criteria:

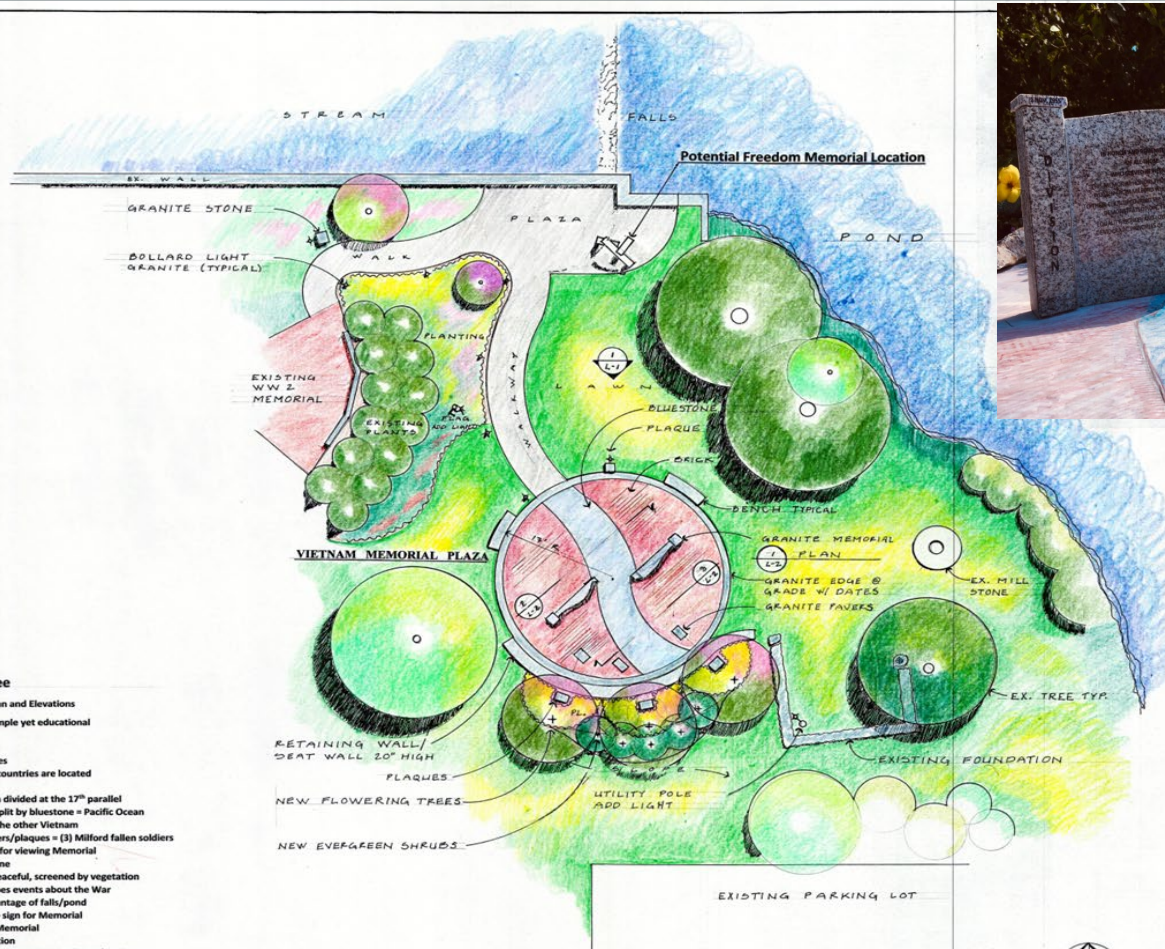
- Town owned property.
- Proximity to existing memorials.
- Proximity to downtown Milford.
- Walkable and provides connectivity.

- Two Locations Considered:

- Union Street/Union Square – Adjacent to the WWII Memorial
- Elm Street - Keyes Memorial Park (east entrance)



Vietnam Memorial - Conceptual Design



Milford Memorial Committee

Vietnam Memorial Design Concept - Plan and Elevations

Theme: To show Countries divided - simple yet educational

Site Plan:

1. Two walls - division in countries
2. Angle of walls show direction countries are located
3. Circular Plaza - the turnaround
 - a. 17 foot radius = Vietnam divided at the 17th parallel
 - b. Walls/name brick area split by bluestone = Pacific Ocean
 - c. One wall is for the USA the other Vietnam
 - d. Three trees/granite pavers/plaques = (3) Milford fallen soldiers
 - e. Seat wall/retaining wall for viewing Memorial
 - f. Granite edge with timeline
 - g. Quiet/reflective site - peaceful, screened by vegetation
 - h. Plaque at plaza - describes events about the War
4. Plaza to the north - takes advantage of falls/pond
5. Granite entry stone (vertical) - sign for Memorial
6. Site fit for safety and viewing Memorial
7. Benches for reflection/meditation
8. Site is connected to the WW2 Memorial via walkway/similar stone, brick, etc.

Elevations:

1. Four small wall elevations with walkway between
2. One wall representing Vietnam the other back home in America
3. The wall is like an open book, telling a story
4. At the split section the surface is shiny and reflective
5. The wall is split at a 17 degree angle to represent the DMZ in Vietnam
6. Scale of walls is similar to existing Memorials in town
7. Simple graphics with verbiage and names
8. Walls show division in both Countries
9. Walls low profile and angle does not block view to pond

1 SITE PLAN



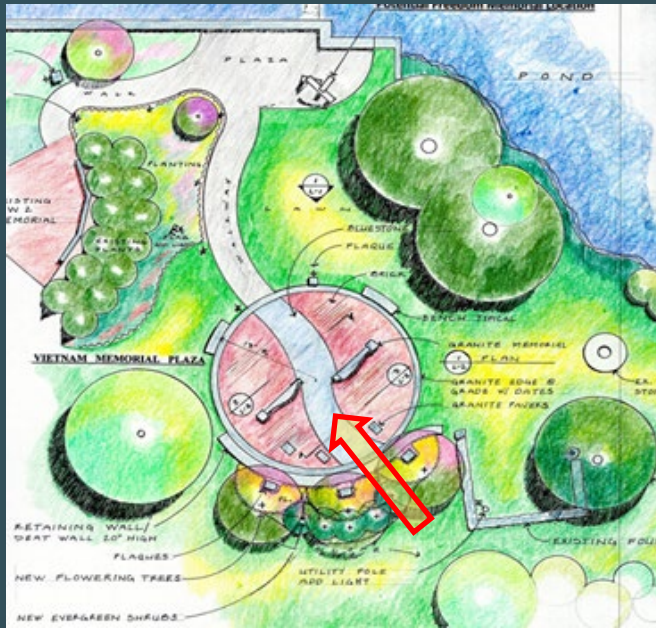
0 8' 16' 32'
SCALE: 1/8" = 1'-0"

L-1
 SITE PLAN
 WAR IN VIETNAM
 MEMORIAL
 Scale: 1/8" = 1'-0"
 Date: 10/09/2019

Vietnam Memorial - Conceptual Design

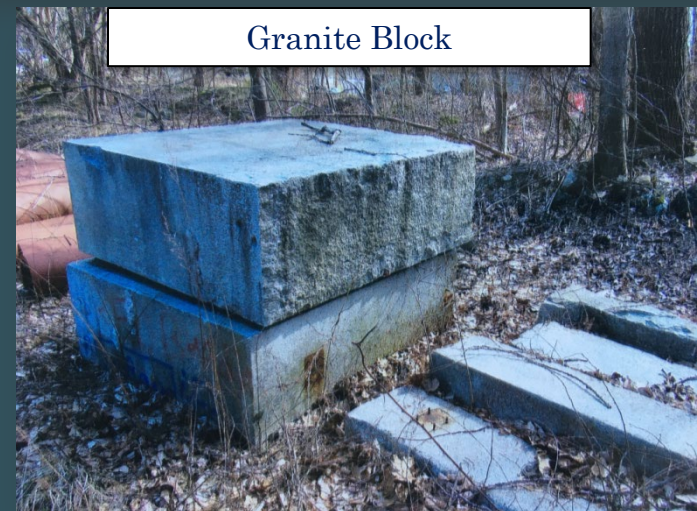
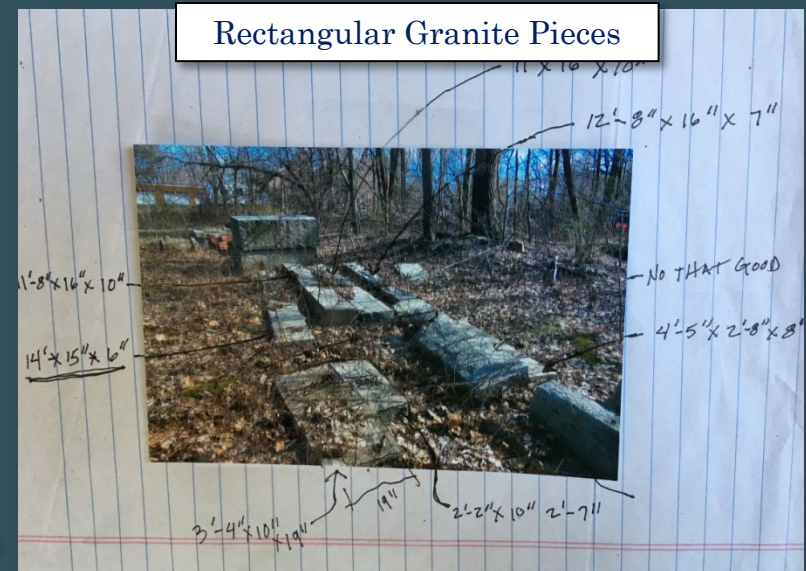


Vietnam Memorial - Conceptual Design



Vietnam Memorial – Use of Town / Donated Material

- Two sources of material:
 - Town owned storage area on Souhegan Street.
 - Donated material from the DeMontigny Family associated with the Tonella quarry.
- Souhegan Street Site - Seeking BOS approval to use several of the long rectangular granite pieces for benches and posts. Large granite block to be used as a platform.
- Former Tonella Quarry – Property owner to donate smaller granite pieces for the 40' retaining wall located behind the memorial. Property owner will move and locate to the site.



NEXT STEPS

- The Milford Memorial Committee is seeking the following Board Actions:
 - Motion from the Board to approve the proposed location of the Vietnam Memorial.
 - Finalization and support of the proposed design
 - Motion to appropriate a portion of the Town owned granite stone material for the Vietnam Memorial (with DPW approval).
 - Motion to accept the donated granite material from the DeMontigny family and approval to move material to site (or location determined) for the construction of 40' decorative retaining wall.
- Committee will continue funding raising efforts.



TOWN OF MILFORD, NH
OFFICE OF COMMUNITY DEVELOPMENT

1 UNION SQUARE, MILFORD, NH 03055

TEL: (603)249-0620

WEB: WWW.MILFORD.NH.GOV

Date: August 6, 2020
To: Board of Selectmen
John Shannon, Town Administrator
From: Lincoln Daley, Community Development Director
Subject: Tax Map 49, Lot 2 – 0 Crestwood Lane
Issuance of Building Permit for Single-Family Residence

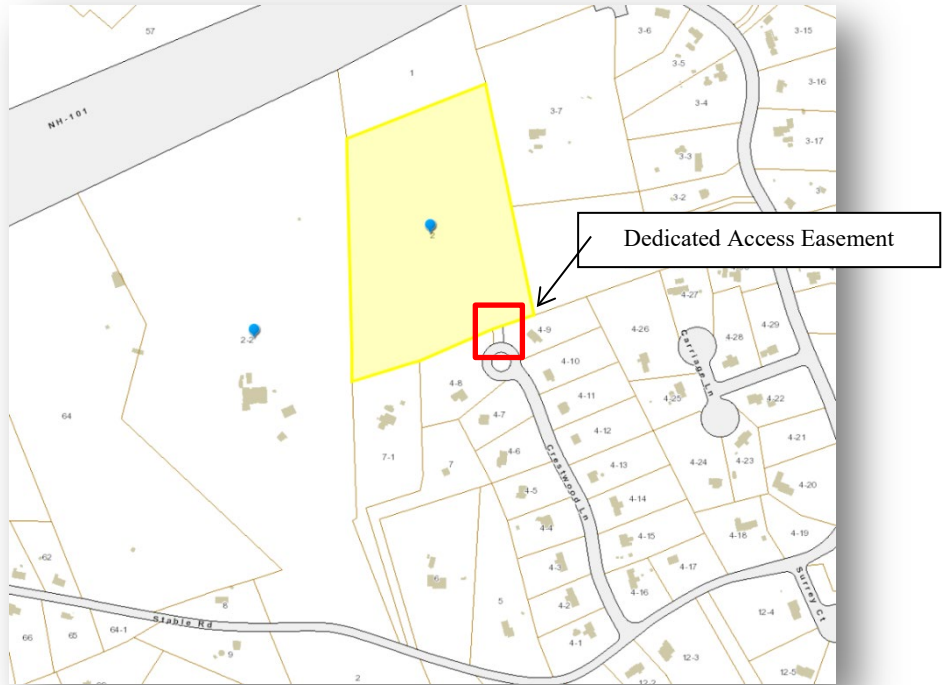
The purpose of this memorandum is to discuss the issuance of a building permit pursuant to RSA 674:41 for a lot of record without legal frontage on a Class V roadway or better. In accordance with the RSA, the Board of Selectmen, after review and comment from the Planning Board, is required to vote to authorize the issuance of a building permit for the erection of the proposed single-family residence on the Tax Map 49, Lot 2 accessed by a private road (access/egress easement).

The Milford Planning Board held a discussion at its meeting on August 4, 2020 regarding the maintenance of a private road off of Crestwood Lane to build a single-family residence on the Tax Map 49, Lot 2 with the applicants, Glenn & Patricia Wright. The applicants presented their interest in building a single-family residence on a 15 acre parcel located in the Residential R off of Crestwood Lane in accordance with the rules of RSA 674:41.I.d. The applicants understood that they would be solely responsible for the maintenance of the private road/driveway and would agree to sign a written, recorded agreement with the BOS absolving the Town of all responsibility for the private road/driveway and all liability. See attached Stipulation and Release Agreement for your review and signature.

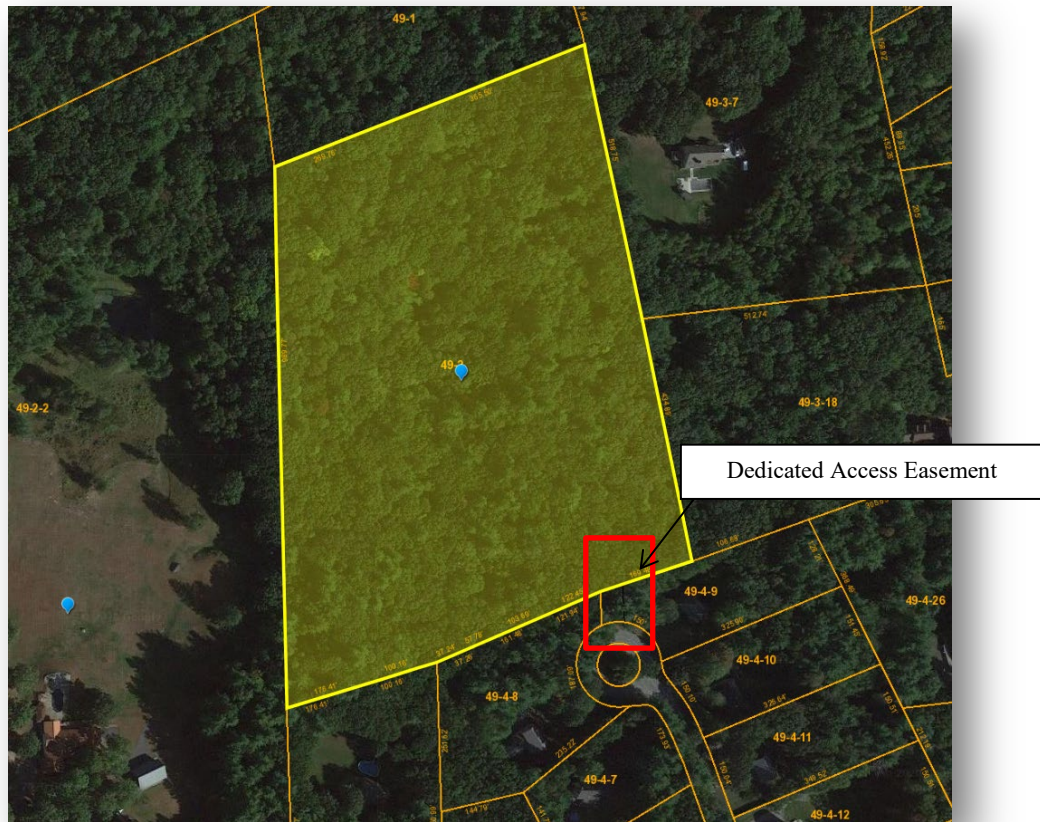
The unanimous consensus of the Planning Board was to recommend to the Board of Selectmen favorable support to issue the building permit and that the applicant be permitted to construct a single-family residence on the subject lot.

Prior to the Planning Board meeting, the applicants appeared before the Board of Adjustment on July 2, 2020 and received a Variance Application from the Milford Zoning Ordinance, Article V, Section 5.04.4.A to permit the construction of a single-family residence on a lot of record, Tax Map 49, Lot 2, with less than the minimum required frontage (200') on a principle route of access on a Class V road or better in the Residential 'R' district. See attached ZBA July 2, 2020 decision.

Tax Map Subject Property:



Aerial Photo of Subject Property:



TOWN OF MILFORD

Zoning Board of Adjustment



DATE: July 9, 2020

TO: Glenn & Patricia Wright
86 Abbot Hill Acres
Wilton, NH 03086

Lena Nguyen
11 Meadowsweet Road
Shrewsbury, MA 01545

RE: ZBA Case #2020-13
Tax Map 49, Lot 2

NOTICE OF DECISION

You are hereby notified that on July 2, 2020, the Zoning Board of Adjustment GRANTED the request for a VARIANCE from the Milford Zoning Ordinance, Article V, Section 5.04.4.A to permit the construction of a single-family residence on a lot of record, Tax Map 49, Lot 2, with less than the minimum required frontage (200') on a principle route of access on a Class V road or better in the Residential 'R' district.

Please note that this does not constitute Planning Board, Building Department, Board of Selectmen or any other state and/or local approvals that may be required for your project.

Lincoln Daley

Community Development Director & Zoning Administrator

7/9/20

Date

In accordance with NH RSA 677:2, any person directly affected by this decision may make an application for a rehearing in this matter. **Any application for rehearing must be received by the Board of Adjustment prior to close of business (4:30 p.m.) on August 3, 2020.**

In accordance with Article X, Section 10.060, this Variance is subject to expiration, if within two (2) years after the granting of a variance or special exception by the Board of Adjustment, none of the work required by a building permit covered by the variance or special exception has been executed, then such variance or special exception shall become null and void except in any case where legal proceedings relative to the variance or special exception shall have caused an undue delay in the execution of the required building permit. Only one, six-month extension may be granted for any variance or special exception. The applicant may apply for the extension at a regularly scheduled Zoning Board meeting.

CC: Building Department
Assessor

Planning Department
File

STIPULATION AND RELEASE AGREEMENT

This Stipulation and Release made on August _____, 2020, by and between the Town of Milford, a municipal corporation with a mailing address of One Union Square, Milford, in the County of Hillsborough and State of New Hampshire, 03055, and Glenn and Patricia Wright, whose mailing address is 86 Abbot Hill Road, Wilton, NH 03086 (herein referred to as "Wright").

WHEREAS, Wright owns a certain tract of land situated off of Crestwood Lane, Milford, New Hampshire, which land is shown as Lot 49-2 on the Milford Tax Map; and

WHEREAS, Wright, or their assigns, plans to apply in the future for a building permit; and WHEREAS, Wright has agreed to sign with the Town of Milford this Stipulation and Release Agreement; and

NOW, THEREFORE, Glenn and Patricia Wright, stipulates and releases the Town of Milford as follows:

- I. Neither the Town of Milford nor any department, officer or employee thereof shall assume liability and/or shall be responsible for the maintenance, passability or condition of the private easement that gives access to Lot 49-2.
2. Neither the Town of Milford nor any department, officer or employee thereof shall be liable

for any damages to any person or entity including, but not limited to, Wright, together with their successors, assigns, personal representatives, guests or invitees, for personal injuries including death and dismemberment and/or property damage as a result of the maintenance, passability or condition of the private easement.

3. Neither the Town of Milford nor any department, officer or employee thereof shall be liable for any damages to any person or entity including, but not limited to, Wright, together with their successors, assigns, personal representatives, guests or invitees, for personal injuries including death and dismemberment and/or property damages as a result of the inability of the Town of Milford or any other person or entity to access said parcel and/or to travel on the private easement accessing said parcel in order to provide school transportation, police, fire, emergency, medical and/or ambulance services, all as a result of the maintenance, passability or condition of the private easement.

4. The rights, privileges and responsibilities of Wright hereunder shall be binding on himself, their successors and assigns and shall run with the land and be binding upon any and all parties having an interest in Lot 49-2 in the future in perpetuity.

5. This Agreement shall be recorded at the Hillsborough County Registry of Deeds and indexed under the grantor index under the name of Glenn and Patricia Wright.

6. This Agreement constitutes the entire understanding between the Town of Milford and Glenn and Patricia Wright. This Agreement can only be amended by document executed by the Town and by Glenn and Patricia Wright, and their successors in interest.

Executed the day and year first above-written.

Town of Milford
By Its Board of Selectmen

By: _____
Gary Daniels, Selectwoman

By: _____
Paul Dargie, Selectmen

By: _____
Laura Dudziak, Selectmen

By: _____
Chris Labonte, Selectmen

By: _____
David Freel, Selectmen

Glenn Wright

Patricia Wright

State of New Hampshire, County of Hillsborough

The foregoing instrument was acknowledged before me this _____ day of August, 2020, by Gary Daniels, Selectmen of the Town of Milford.

Notary Public
Name: _____
My Commission Expires: _____

State of New Hampshire, County of Hillsborough

The foregoing instrument was acknowledged before me this _____ day of August, 2020, by Paul Dargie, Selectmen of the Town of Milford.

Notary Public
Name: _____
My Commission Expires: _____

State of New Hampshire, County of Hillsborough

The foregoing instrument was acknowledged before me this _____ day of August, 2020, by Laura Dudziak, Selectmen of the Town of Milford.

Notary Public
Name: _____
My Commission Expires: _____

State of New Hampshire, County of Hillsborough

The foregoing instrument was acknowledged before me this _____ day of August, 2020, by Chris Labonte, Selectmen of the Town of Milford.

Notary Public
Name: _____
My Commission Expires: _____

State of New Hampshire, County of Hillsborough

The foregoing instrument was acknowledged before me this _____ day of August, 2020, by David Freel, Selectmen of the Town of Milford.

Notary Public
Name: _____
My Commission Expires: _____



Town of Milford, New Hampshire

DRAFT RFP 2021-001 Town of Milford P25 Radio System



August 10, 2020

Table of Contents

1	General Instructions	13
1.1	Purpose	13
1.2	Project Overview	13
1.3	Definitions.....	13
1.4	Procurement Schedule.....	14
	Table 1-1 Procurement Schedule.....	14
1.5	Questions Regarding This RFP	14
1.6	Mandatory Pre-Proposal Conference	14
1.7	Site Visits.....	15
1.8	Answers and Addenda	15
1.9	Instructions for Submitting Proposals	15
1.10	Withdrawal of Proposals	16
1.11	Technical Proposal Evaluation.....	16
1.12	Technical Proposal Questions	16
1.13	Oral Presentations	16
1.14	Price Proposal Evaluation	16
1.15	Competitive Negotiations	16
1.16	Intent to Award	17
1.17	Contract Negotiations.....	17
1.18	Contract Execution	17
1.19	RFP Property of Milford.....	17
1.20	Rights to Submitted Material	17
1.21	Confidentiality.....	17
1.22	Incurred Costs.....	17
1.23	Proposal Errors and Irregularities	18
1.24	Open Procurement.....	18
1.25	Options.....	18
2	Proposal Instructions	19
2.1	Proposal Outline.....	19
2.2	Technical Proposal.....	19
2.2.1	Introduction and Letter of Transmittal	19
2.2.2	Point-by-Point Compliance Response	19
2.2.2.1	Compliance Matrix	19
2.2.2.2	Additional Instructions.....	20
2.2.3	Responsibilities Response.....	20
2.2.3.1	Responsibilities Matrix	20
2.2.3.2	Additional Instructions.....	20
2.2.4	Qualifications	21
2.2.4.1	Project Team and References.....	21
2.2.4.2	Organization Experience and Reference.....	21
2.2.4.3	Warranty and Maintenance Service Organization Experience and References	21
2.2.5	Additional Information	21
2.3	Price Proposal.....	21
2.3.1	Price Forms.....	21
2.3.2	Proposal Surety	22
3	General Terms and Conditions	23

3.1	Proposed Terms and Conditions	23
3.2	Order of Precedence	23
3.3	Pricing and Payment	23
3.4	Price Guarantee	24
3.5	Contract Security	24
3.6	Contractual Claims	24
3.7	Sales Tax Exemption	24
3.8	Liquidated Damages	25
3.9	Indemnity	25
3.10	Liability Insurance	25
3.11	Assignment	26
3.12	News Release	26
3.13	Transportation and Storage	26
3.14	Transfer of Title	26
3.15	Non-Discrimination in Employment	26
3.16	Employment of Illegal Aliens	27
3.17	Force Majeure	27
3.18	Site Visits	27
3.19	CONTRACTOR Responsibilities	27
3.20	System Responsibility	27
3.21	Property Damage	28
3.22	System Use before Acceptance	28
3.23	Retesting	28
4	Statement of Work	29
4.1	Project Management	29
4.1.1	Project Manager	29
4.1.2	Changes to CONTRACTOR'S Key Personnel	29
4.1.3	Subcontractors	29
4.1.4	CONTRACTOR Registration	29
4.1.5	Project Management Plan	29
4.1.5.1	Project Schedule	29
4.1.5.2	Project Review Meetings and Teleconferences	30
4.1.5.3	Action Item List	30
4.1.5.4	Project Status Reports	30
4.1.6	Submittals	31
	Table 4-1 Submittal Schedule	32
4.1.7	Transmittals	32
4.1.8	Email	33
4.1.9	Project Documentation	33
4.1.10	Risk Management	33
4.1.11	Change Orders	34
4.1.12	Punch List	34
4.2	Planning and Design	34
4.2.1	Project Kickoff Meeting	34
4.2.2	Detailed Design Review (DDR)	35
4.2.3	Detailed Design Documentation	36
4.2.4	Connectivity Network	36
4.2.5	Physical Facilities	36
4.3	Implementation	37
4.3.1	Permits and Licensing	37
4.3.2	SHPO and NEPA Studies	37

4.3.3	Coordination with Milford's Operations	37
4.3.4	Infrastructure Equipment Orders	37
4.3.5	Subscriber Equipment Orders	37
4.3.6	Relocation of Existing Equipment	37
4.3.7	Equipment, Systems and Software.....	37
4.3.8	Installation.....	38
4.3.9	Utilities.....	38
4.3.9.1	Temporary Electrical Power	38
4.3.9.2	Permanent Electrical Power	38
4.3.10	Inspect Excavations.....	38
4.3.11	Existing AM Radio Station Towers	38
4.3.12	Generator Maintenance and Service	38
4.3.13	Frequency Licensing.....	39
4.3.14	Interference Analysis and Mitigation.....	39
4.3.15	Fleet Mapping	39
4.3.16	Draft Acceptance Test Plan	39
4.3.17	Shipment and Storage	40
4.3.18	Connectivity Network Field Acceptance Test Plan	40
4.3.19	Radio System Field Acceptance Test Plan.....	40
4.4	System Acceptance	40
4.4.1	Inspections.....	40
4.4.1.1	Facility Inspection and Testing	40
4.4.1.2	Final Inspection of Radio Equipment.....	41
4.4.2	Connectivity Network Field Acceptance Testing	41
4.4.3	Radio System Acceptance Testing.....	41
4.4.3.1	Base Station Tests.....	41
4.4.3.2	Field Acceptance Testing	42
4.4.3.3	Failure Mode Testing	42
4.4.3.4	Simulcast Alignment Testing	42
4.4.4	Coverage Acceptance Testing.....	42
4.4.4.1	Accessible Test Tiles	43
4.4.4.2	Inaccessible Test Tiles	43
4.4.4.3	Tile Retries.....	43
4.4.4.4	Retry Location.....	43
4.4.4.5	Coverage Retesting	43
4.4.4.6	OPTION: Critical Building Coverage Testing	44
4.4.4.7	Acceptance Test Results.....	44
4.4.5	Thirty (30) Day Performance Period	44
4.4.6	System Cutover	45
4.4.7	Conditional Acceptance	45
4.4.8	Final System Acceptance	45
4.5	Subscriber Equipment Programming, Installation, and Issuance	45
4.5.1	Subscriber Equipment Programming.....	45
4.5.2	Mobile Radio Equipment Installation	46
4.5.3	Control Station Equipment Installation.....	46
4.6	Documentation	46
4.6.1	Standard Manuals.....	46
4.6.2	Physical Facilities As-Built Documentation.....	46
4.6.3	System Maintenance Documentation	47
4.6.4	Subscriber Documentation.....	48
4.7	Training	48
4.7.1	Types of Training	48
4.7.2	Training Materials	48

4.7.3	Travel and Lodging	49
4.7.4	On-the-Job Training	49
4.7.5	Training Descriptions	49
4.7.5.1	Radio User Training	49
4.7.5.2	Radio User Web Based Training	49
4.7.5.3	Train-the-Trainer	50
4.7.5.4	Console Operator Training	50
4.7.5.5	Radio System Administration and Management Training	50
4.7.5.6	Radio System Maintenance Training	51
4.7.5.7	Connectivity Network Maintenance Training	51
4.8	Warranty and Maintenance	51
4.8.1	Warranty	51
4.8.2	New Equipment Purchases	52
4.8.3	System Life-Cycle Support	52
4.8.4	Maintenance Contracts – Years 2-15	52
4.8.5	Maintenance Services	52
4.8.5.1	Hardware Maintenance	52
4.8.5.1.1	Service Plan	52
4.8.5.1.2	Preventive Maintenance	52
4.8.5.1.3	Subscriber Units	52
4.8.5.2	Emergency Service	53
4.8.5.2.1	Availability	53
4.8.5.2.2	Response Times	53
4.8.5.3	Software Maintenance	53
4.8.5.3.1	Corrective Upgrades	53
4.8.5.3.2	Enhancements	54
4.8.5.3.3	OPTION: Software Enhancement Subscription	54
4.8.5.3.4	Backup Media and Manuals	54
4.8.5.4	Technical Support	54
4.8.6	Service Organization	54
4.8.7	Service Records	54
4.8.8	Spare Parts	55
4.8.9	Rolling Repair and Return	55
4.8.10	OPTION: Full-time Service Personnel	55
4.8.11	OPTION: Network Engineer	56
4.8.12	Training	56
4.8.13	Equipment	56
5	General System Requirements	57
5.1	Scope	57
5.2	Deviations from the Specifications	57
5.3	Brand Names	57
5.4	System Reliability	57
5.4.1	Single-Point Failures	57
5.4.2	Multi-Point Failures	57
5.5	General Equipment Specifications	57
5.5.1	New Equipment	57
5.5.2	Environmental Specifications	58
5.5.3	Equipment Power Requirements	58
5.5.4	Equipment Grounding	58
5.5.5	Surge Protection	58
5.5.6	FCC Part 15 Devices	58

5.5.7	Proprietary Equipment	58
5.6	Software and Hardware Versions	58
5.7	Computer and Network Security	59
5.7.1	Computer Security	59
5.7.1.1	Anti-Virus Software	59
5.7.1.2	Operating System Configuration	59
5.7.2	Network Security	59
5.7.2.1	Authentication	59
5.7.2.2	Ports and Protocols	59
5.7.2.3	DMZ Support	59
5.8	Installation	59
5.8.1	Calibration of Test Equipment	60
5.8.2	Racks and Cabinets	60
5.8.3	Rack and Cabinet Installation	60
5.8.4	Electromagnetic Exposure	61
5.8.5	Labeling	61
5.9	Contractor Commitment	61
6	Radio System Requirements	62
6.1	New System Description	62
6.1.1	P25 Conventional Radio System	62
6.1.2	Radio Sites	62
6.1.3	Frequency Plan and Traffic Loading Analysis	62
	Table 6-1 List of subscribers by agency and Dispatch Center Consoles (including back-up control stations) 63	
6.2	Features and Functions	63
6.2.1	System Identification Codes	63
6.2.2	Unit Identifiers	63
6.2.3	Emergency Access	63
6.2.4	Denial of Access	63
6.2.5	Unit Disable	64
6.2.6	Over-the-Air Programming (OTAP)	64
6.2.7	Encryption	64
6.2.7.1	Encryption Algorithms and Keys	64
6.2.7.2	End-to-End Encryption	64
6.2.7.3	OPTION: Over-the-Air Rekeying	64
6.2.7.3.1	OPTION: Key Management Facility	64
6.2.7.4	OPTION: KMF Workstations	64
	Table 6-2 KMF Workstation Locations	64
6.2.8	Option: ISSI	65
6.2.9	Station Identification	65
6.2.10	Interoperability Channels	65
	Table 6-3 Milford Required Interoperability Channels	65
6.3	Performance	65
6.3.1	System Access Time	65
6.3.2	System Throughput Delay	66
6.3.3	Interference	66
6.3.3.1	Self-Interference	66
6.3.3.2	Interference to Collocated Equipment	66
6.3.4	Radio System Reliability	66
6.3.4.1	System Failure Modes	66
6.3.4.2	Simulcast System Failures	66

6.3.5	Radio System Coverage	66
6.3.5.1	Service Areas	66
	Figure 6-1 Service Areas	67
6.3.5.2	Required Coverage Level	67
6.3.5.3	Service Area Reliability	67
	Table 6-4 Service Area Reliability Requirements	68
6.3.5.4	Critical Building Coverage	68
	Table 6-5 Critical Buildings	68
6.4	Radio System Equipment	68
6.4.1	Base Station	69
6.4.2	OPTION: Voting Comparator	69
6.4.3	Antenna Systems	69
6.4.3.1	Transmission Lines and Antenna System Accessories	69
6.4.3.2	Transmit Combiners	69
6.4.3.3	Receiver Multi-couplers	69
6.5	Simulcast Requirements	69
6.5.1	Simulcast Design	70
6.5.2	Transmitter Frequency Stability	70
6.5.3	Automated Simulcast System Timing	70
6.5.4	Simulcast System Alignment	70
6.6	VHF Paging System	70
6.7	Console System	71
6.7.1	Dispatch Console System Configuration	71
6.7.2	Features and Functions	71
6.7.2.1	P25 Conventional Radio System	71
6.7.2.2	Interoperability Radio Channels	71
6.7.2.2.1	<i>Tone Remote Control</i>	71
6.7.2.2.2	<i>E&M Signaling</i>	71
6.7.2.2.3	<i>System Guard Tone</i>	71
6.7.2.3	Backup Control Stations	72
6.7.2.4	Instant Recall Recorder	72
6.7.2.5	Paging Encoder	72
6.7.2.6	CAD System Interface	72
6.7.2.7	OPTION: Auxiliary Inputs and Outputs	72
6.7.2.8	Concurrent Console Operation	72
6.7.3	Console Equipment	72
6.7.3.1	Physical Configuration	72
6.7.3.2	Operator Position Hardware	73
6.7.3.3	Workstation	73
6.7.3.4	Flat-panel Display	73
6.7.3.5	Select and Unselect Speakers	73
6.7.3.6	Foot Switch	73
6.7.3.7	Dual Headset Jacks	74
6.7.4	Console System Operation	74
6.7.4.1	Console Operating Characteristics	74
6.7.4.2	Display Areas	74
6.7.4.3	Active Status Indicator	74
6.7.4.4	Console Capabilities	75
6.7.4.5	Time Synchronization	75
6.7.5	OPTION: Remote Dispatch Consoles	75
6.8	Logging Recorder	75
6.9	Network Management System	75
6.9.1	General	75

6.9.2	Configuration Management.....	76
6.9.3	Performance Management	76
6.9.4	Security Management.....	77
6.9.5	Fault/Alarm Management.....	77
6.9.5.1	Alarm Points	77
6.9.5.2	Alarm Point Inputs	78
6.9.5.3	Alarm Indication	78
6.9.5.4	Redundancy.....	79
6.9.5.5	Visible and Audible Annunciation	79
6.9.5.6	Historical Data	79
7	Connectivity Network Requirements.....	80
7.1	Connectivity Network Requirements	80
7.2	Existing Connectivity Network.....	80
7.3	Microwave System Requirements	80
7.3.1	Configuration.....	80
7.3.2	Microwave Frequency Bands	80
7.3.3	Microwave System Performance	80
7.3.3.1	Path Availability	80
7.3.3.2	Circuit Quality	81
7.4	Network Management System.....	81
7.4.1	Configuration Management.....	81
7.4.2	Performance Management	81
7.4.3	Security Management	82
7.4.4	Fault Management.....	82
7.4.4.1	Self-Diagnostic Capabilities	82
7.4.4.2	Alarm Points	82
7.4.4.3	Alarm Point Inputs	82
7.4.4.4	Alarm Indication	83
7.4.4.5	Alarm Point Attributes.....	83
7.4.4.6	Alarm Notification Media.....	84
7.4.4.7	Alarm Analysis	84
7.4.4.8	Visible and Audible Annunciation	84
7.4.4.9	Historical Data	84
7.4.5	Redundancy.....	84
7.4.6	Protocols	84
7.5	Software	85
7.6	Equipment Requirements.....	85
7.6.1	Digital Microwave Radio	85
7.6.1.1	Redundancy.....	85
7.6.1.2	Spur-Configured Microwave Equipment.....	85
7.6.2	Microwave Power Supplies.....	85
7.6.2.1	Battery Charger/Powerboard Equipment.....	85
7.6.2.2	Battery Plant Equipment	86
7.6.3	Microwave Antenna Systems	86
7.6.3.1	Microwave Antenna Mounting	86
7.6.3.2	Microwave Transmission Lines	86
7.6.4	Dehydrator/Pressurization System	86
7.6.5	Optical Transport Network Equipment.....	87
7.6.5.1	Fiber Optic Cable.....	87
7.6.5.2	Transport Node Equipment	87
7.6.5.3	Digital Multiplexer Equipment.....	88

8	Subscriber Equipment.....	89
8.1	Definitions.....	89
8.2	Tiers	89
	Table 8-1 Subscriber Unit Features.....	90
8.3	Standards.....	90
8.4	Environmental Specifications	91
	Table 8-2 Environmental Specifications for Subscriber Equipment	91
8.5	Project 25 Compliance.....	91
8.6	Over-the-Air Programming (OTAP).....	91
8.7	OPTION: Multiband.....	92
8.8	OPTION: GPS Location Services	92
8.9	OPTION: PTT Cellular Application.....	92
8.10	OPTION: Wi-Fi/LTE Radio Module	92
8.11	OPTION: Bluetooth	92
8.12	OPTION: Encryption	92
	8.12.1 OPTION: Key Fill Device	92
	8.12.2 OPTION: Over-the-Air-Rekeying	92
8.13	Re-use of Existing Subscribers	92
8.14	Mobile Radio Equipment.....	93
	8.14.1 Trunk-Mounted Mobile Radio Units	93
	8.14.2 Dash-Mounted Mobile Radio Units	93
	8.14.3 Mobile Radio Antennas.....	93
	8.14.3.1 Standard Mobile Radio Antennas.....	93
	8.14.3.2 OPTION: Disguised Mobile Radio Antenna	93
	8.14.3.3 Mobile Antenna Installation	94
8.15	Portable Radio Equipment	94
	8.15.1 Portable Battery Chargers	94
	8.15.2 OPTION: Vehicular Charger	94
	8.15.3 OPTION: Speaker-microphone.....	94
8.16	Digital Vehicular Repeater	95
	8.16.1 System Operation	95
	8.16.1.1 Mobile Operation	95
	8.16.1.2 Local Repeat.....	95
	8.16.1.3 System Repeat	95
	8.16.2 Functions	95
	8.16.2.1 Multiple DVR's	95
	8.16.2.2 Portable Priority	96
	8.16.2.3 Transmit Time-Out.....	96
8.17	Control Station	96
9	Physical Facilities Requirements	97
9.1	General Requirements.....	97
9.2	References.....	97
	9.2.1 Normative References	97
	9.2.2 Informative References.....	98
9.3	Sites	99
	9.3.1 General	99
	Figure 9-1 Typical Communications Site Layout.....	100
	9.3.2 Existing Sites	100
	Table 9-1 Existing and Potential Radio / Microwave Sites.....	101
	9.3.3 New Sites.....	101

9.4	Utilities.....	101
9.4.1	Existing Utilities.....	101
9.4.2	Temporary Electric Service.....	101
9.4.3	Permanent Electric Service.....	102
9.5	Earthwork.....	102
9.5.1	Geotechnical Investigations.....	102
9.5.2	Erosion Control.....	102
9.5.3	Materials for Fill, Sub-Grade Preparation and Backfill.....	102
9.5.4	Clearing and Grubbing.....	102
9.5.5	Fills.....	103
9.5.6	Backfilling Beneath and Adjacent to Buildings, Structures and Towers.....	103
9.5.7	Backfilling Trenches.....	103
9.5.8	Plastic Marking Tape.....	103
9.5.9	Compaction.....	103
9.5.10	Soil Sterilization.....	104
9.5.11	Fenced Compound.....	104
9.6	Access Road.....	104
9.7	Parking Area.....	104
9.8	Chain-Link Fencing.....	104
9.9	Bollards.....	105
9.10	Foundations.....	105
9.10.1	Design.....	105
9.10.2	Installation.....	105
9.10.3	Materials.....	105
9.10.4	Concrete Testing.....	105
9.11	Towers.....	105
9.11.1	Tower Classification.....	105
9.11.2	Loads.....	106
9.11.3	Twist and Sway.....	106
9.11.4	Analysis of Towers and Antenna Support Structures.....	106
9.11.5	Existing Tower Condition Assessment and Mapping.....	106
9.11.6	Materials and Fabrication.....	106
9.11.7	Tower Erection.....	106
9.11.8	Tower Climbing Facilities.....	107
9.11.9	Obstruction Marking and Lighting.....	107
9.11.10	Ice Bridges.....	107
9.11.11	Cable Installation.....	107
9.11.12	FAA Notifications.....	107
9.11.13	OPTION: Security Cameras on Tower Structure.....	107
9.12	Equipment Shelters – Arrangement & Size.....	108
	Figure 9-2 Typical Shelter Layout.....	108
9.13	Building Systems.....	108
9.13.1	HVAC.....	108
9.13.2	Fire Alarm System.....	109
9.13.3	Electrical System.....	109
9.13.3.1	Codes and Standards.....	109
9.13.3.2	Electrical System Design.....	109
	Figure 9-3 Typical Shelter One-Line Diagram.....	110
9.13.3.3	Buses.....	110
9.13.3.4	Bypass Switches.....	110
9.13.3.5	Temporary Backup Generator.....	111
9.13.3.6	Surge Suppression.....	111
9.13.3.7	Equipment and Raceways.....	111

9.13.3.8	Receptacles and Plugs	111
9.13.3.9	Lighting	111
9.13.4	Safety	111
9.14	Backup Power Systems	111
9.14.1	Standby Generators	111
9.14.1.1	Generator Location	112
9.14.1.2	Generator Installation	112
9.14.1.3	Automatic Transfer Switches	112
9.14.1.4	Starting System	112
9.14.1.5	Fuel System	112
9.14.1.6	Noise Abatement	113
9.14.1.7	Alarms	113
9.14.1.8	Spare Parts	113
9.14.2	Uninterruptible Power Supplies	113
9.14.2.1	Emergency Shutoff	113
9.14.2.2	Bypass Switch	113
9.15	Grounding	114
9.15.1	Common Ground System	114
9.15.2	Grounding Conductors	114
9.15.2.1	Exterior Grounding Conductors	114
9.15.2.2	Interior Grounding Conductors	114
9.15.2.3	Grounding Conductor Bends	115
9.15.3	Grounding Equipment	115
9.15.4	Connections	115
9.15.5	Exterior Grounding System	115
9.15.5.1	Ground Rods	115
9.15.5.2	Electrolytic Ground Rods	115
9.15.5.3	Ground Plates	116
9.15.5.4	Doping of Ground Systems	116
9.15.5.5	Grounding Electrode System Conductors	116
9.15.5.6	Ground Rings	116
9.15.5.7	Ground Radials	116
9.15.6	Grounding of Towers and Other Antenna Support Structures	116
9.15.6.1	Steel Monopoles	116
9.15.6.2	Self-Supporting Towers	116
9.15.6.3	Guyed Towers	117
9.15.6.4	Antenna Support Structures on Buildings	117
9.15.6.5	Ice Bridges	117
9.15.6.6	Tower Ground Bus Bar	118
9.15.6.7	Transmission Lines	118
9.15.7	Grounding of Buildings or Shelters	118
9.15.7.1	Exterior Ground Ring	118
9.15.7.2	Exterior Ground Bus Bar	118
9.15.7.3	Cable Entrance Panel	119
9.15.8	Grounding of Fences	119
9.15.9	Grounding of Metal Objects	119
9.15.10	Interior Grounding System	119
9.15.10.1	Single-Point Grounding System	119
9.15.10.2	Master Ground Bus Bar	119
9.15.10.3	Secondary Ground Bus Bars	119
9.15.10.4	Grounding of Surge Suppressors	120
9.15.10.5	Interior Grounding Ring	120
9.15.10.6	Connections to the Interior Ground Ring	120

9.15.10.7	Equipment Grounding Bus	120
9.15.10.8	Rack and Cabinet Ground Bus.....	120
9.15.10.9	Grounding of Equipment.....	120
9.15.10.10	Cable Trays	121
9.15.11	Communications Center Grounding	121
9.16	Surge Suppression.....	121
9.16.1	Transmission Line Surge Protective Devices	121
9.16.2	Electric Service Panelboard Surge Suppression	121
9.16.3	AC Power In-Line Protection	121
9.16.4	Telephone Lines	122
9.16.5	GPS Receiver	122
10	Abbreviations & Acronyms	123

Appendix A - Evaluation Criteria

Appendix B - Compliance Matrix

Appendix C - Responsibilities Matrix

Appendix D - Price Proposal Workbook and Instructions

Appendix E – Bid Bond Form

1 General Instructions

1.1 Purpose

The Town of Milford, New Hampshire is requesting proposals for a P25 radio system as specified herein. Proposers interested in providing the specified goods and services shall submit a Proposal to Milford as instructed in this Request for Proposals (RFP).

1.2 Project Overview

The Town of Milford seeks to replace its legacy conventional VHF analog radio system. Milford prefers a single contractor to provide a turnkey implementation of a modern P25 radio system, including a connectivity network and physical facilities necessary to support the new radio system.

Milford has a land area of 25heir needs.

The new Milford Radio Communications System will be a P25 system using VHF frequencies for voice and data within its Town limits. The successful Proposer shall design and install fixed equipment that must be maintainable for at least 15 years after Final System Acceptance.

1.3 Definitions

Milford: Town of Milford

PROPOSER: Any firm that submits a proposal in response to this RFP.

CONTRACTOR: The successful PROPOSER with whom a contract is executed pursuant to this RFP.

CTA: The firm (CTA Consultants, LLC) assisting Milford in the evaluation of Proposals, implementation, attending project reviews and teleconferences, witnessing testing, reviewing submittals, and making recommendations to Milford on approval of submittals, change orders, in accordance with the requirements of the contract.

PROJECT TEAM: Representatives (typically project managers, deputy project managers, lead engineers and significant assigned project members of Milford, CTA and CONTRACTOR[S]), are responsible for management and implementation of the project and communication with other parties on the PROJECT TEAM.

DAYS:

- "Calendar Days" means any day appearing on the calendar, whether a weekday, weekend day, national holiday, state holiday or other day
- "Days" mean Calendar Days, unless specifically listed
- "Business Days" means Calendar Days excluding: Saturdays, Sundays, and national and/or state recognized holidays

SCOPE OF WORK: The general character and range of Services and supplies needed, the work's purpose and objectives, and an overview of the performance outcomes expected by Milford.

SERVICES: The services to be performed under the Contract.

STATEMENT OF WORK: The specific provision in the final Contract which sets forth and defines in detail (within the identified Scope of Work) the agreed-upon objectives, expectations, performance standards, Services, deliverables, schedule for delivery and other obligations.

1.4 Procurement Schedule

The anticipated schedule for this procurement is found in Table 1-1. Milford reserves the right to postpone the date and time for submission of Proposals at any time prior to the Proposal deadline, all changes will be made via the addendum process and posted to the procurement website.

Scheduled Event	Date
RFP Release	[TBD]
Mandatory Pre-Proposal Conference	[TBD + 2 to 3 weeks]
Deadline for PROPOSER Questions	[TBD + 4 to 6 weeks]
Deadline for Proposal Submission	[TBD + 2 to 3 months]
Proposal Evaluation Complete	[TBD + 4 to 6 months]
Contract Execution	May, 2021 (Anticipated)

Table 1-1 Procurement Schedule

Technical and Price proposals should remain valid without changes for a time period of one year after submission deadline date.

1.5 Questions Regarding This RFP

All questions regarding this RFP shall be submitted in writing to the Town Administrator:

John Shannon
 Town of Milford
 C/O Town Administrator
 1 Union Square, Milford, NH 03055
 JShannon@Milford.NH.gov

Questions or comments must be received by the date indicated in Table 1-1.

PROPOSERS shall not communicate with any other representatives of Milford or CTA regarding this RFP unless directed by the Town Administrator.

1.6 Mandatory Pre-Proposal Conference

A mandatory pre-proposal conference for all interested parties will be held for this RFP:

Mandatory Pre-Proposal Conference	
Date and Time	[Time, day, and date]
Location	[Room number and address]
Teleconference (if allowed)	(phone number, conference code, any other associated information)

For directions, please contact the Town Administrator at [**Telephone Number**].

Written questions regarding the RFP may be submitted to the Town Administrator in advance of the pre-proposal conference. Questions not submitted at least one week prior to the pre-proposal conference may not be fully addressed at the conference.

1.7 Site Visits

PROPOSERS are responsible for visiting sites involved in this project prior to submission of a Proposal. Site visits shall occur directly following the pre-proposal meeting.

1.8 Answers and Addenda

Milford will disseminate all questions and answers to all prospective PROPOSERS. Should changes to the RFP become necessary, the changes will be contained in an addendum issued by Milford and posted to the Milford's procurement website www.milford.nh.gov. Receipt of all Addenda must be acknowledged in the Transmittal Letter.

Verbal responses to questions are not official until the questions have been submitted in writing by the prospective PROPOSER and a written response has been distributed by Milford to all prospective PROPOSERS.

1.9 Instructions for Submitting Proposals

PROPOSERS shall submit the separate Technical and Price Proposals to the following address:

John Shannon
Town of Milford
C/O Town Administrator
1 Union Square, Milford, NH 03055
JShannon@Milford.NH.gov

Proposals are due by the date and time indicated in Table 1-1. Proposals submitted after this deadline will not be accepted. PROPOSERS shall submit the follow quantities:

- [one] original hard copy
- [four] hard copies
- [two] electronic copies

Technical and Price Proposals shall be submitted in separate sealed packages labeled as follows:

Town of Milford, New Hampshire
RFP No. 2021-001
Town of Milford P25 Radio System

PROPOSER'S Name
TECHNICAL PROPOSAL *or* PRICE PROPOSAL *as applicable*

Electronic copy software formats:

- Adobe Acrobat Portable Document Format (PDF): Technical and Price proposals must be submitted in separate PDF documents
- Microsoft Excel (Pricing Pages, Responsibilities Matrix, Compliance Matrix)

Technical Proposals shall describe PROPOSER's design, including maps, figures, tables, photographs, etc. The PROPOSER shall describe capabilities, limitations, operational procedures of all proposed equipment (including options) and shall provide each specifications sheet.

**ABSOLUTELY NO PRICE INFORMATION SHALL BE INCLUDED IN THE TECHNICAL PROPOSAL.
TECHNICAL PROPOSALS CONTAINING PRICE INFORMATION MAY BE DISQUALIFIED.**

1.10 Withdrawal of Proposals

PROPOSERS may withdraw Proposals by written notice received by the Town Administrator any time prior to the Proposal submission deadline.

1.11 Technical Proposal Evaluation

Technical Proposals will be evaluated by a technical evaluation team consisting of representatives of Milford and CTA. Technical Proposals will be evaluated in accordance with the technical categories of evaluation found in Appendix A.

1.12 Technical Proposal Questions

The technical evaluation team will generate a list of written questions for each Proposal and will forward the questions to the PROPOSER. Each PROPOSER shall submit written responses to the Town Administrator within five (5) working days from the receipt of the questions. The written responses will be considered a part of the Proposal.

1.13 Oral Presentations

Milford may invite PROPOSERS to make oral presentations. Suitable time will be scheduled for each PROPOSER'S presentation. Each PROPOSER should allow adequate time during this period for questions from Milford's personnel, officials, or their advisors.

During the oral presentation, discussions shall be limited to the system, equipment and software proposed, including future capabilities for expansion of the system. Price proposals will NOT be discussed during the oral presentation; the primary purpose of the oral presentation is to provide a forum for discussion of what has been proposed and is not a negotiating session.

1.14 Price Proposal Evaluation

Price Proposals will be evaluated by a price evaluation team consisting of representatives of Milford and CTA. Price Proposals will be evaluated in accordance with the price categories of evaluation found in Appendix A. The price evaluation will be independent of the technical evaluation.

1.15 Competitive Negotiations

Milford reserves the right to enter competitive negotiations with one or more PROPOSERS regarding variations to the original Proposal that may be in the best interest of Milford. The results of these negotiations will be factored into both the Technical and Price Evaluations prior to final scoring.

1.16 Intent to Award

The evaluation team will combine technical evaluation points with price evaluation points and will recommend to Milford that the contract be awarded to the Proposal scoring the highest number of points. The selected PROPOSER will be notified of the intent to award and begin the process of negotiating a contract.

1.17 Contract Negotiations

Milford will negotiate with the highest ranked PROPOSER regarding variations to the original Proposal and questions/answers that may be in the best interest of Milford. Milford reserves the right to negotiate additional and/or supplemental terms and conditions with the highest ranked PROPOSER.

If Milford determines that negotiations with the highest ranked PROPOSER have reached an impasse, Milford at its discretion may terminate negotiations with the highest-ranked PROPOSER and commence negotiations with the second highest-ranked PROPOSER.

1.18 Contract Execution

Upon the successful completion of contract negotiations, Milford will prepare and submit a final negotiated contract to the awarded PROPOSER at the address provided in the Proposal. The awarded PROPOSER shall execute the contract within 14 days after the receipt of the contract.

1.19 RFP Property of Milford

This RFP in its entirety is the property of Milford. The PROPOSER shall not copy or disseminate any portion of these specifications without express written authorization of Milford except as necessary in the preparation of the Proposal. Any authorized copies of these specifications or portions thereof shall include a similar paragraph prohibiting further copying or dissemination.

1.20 Rights to Submitted Material

All materials submitted by the PROPOSER in response to this RFP shall become the property of Milford.

1.21 Confidentiality

All Proposals shall be open to public disclosure unless specific information included therein is identified as exempt from public disclosure.

If a PROPOSER believes that any portion of its Proposal contains proprietary information exempt from public disclosure, the PROPOSER shall clearly identify such portions in its Proposal. Identifying the Proposal as trade secret, confidential or otherwise exempt from disclosure is not acceptable.

Milford shall not be liable for disclosure of any proprietary information that is not clearly identified as such in the Proposal.

1.22 Incurred Costs

Milford shall not be liable for any costs incurred by the PROPOSER in preparing, submitting, or presenting Proposals; or in anticipation of being awarded the contract under this RFP.

Claims for additional compensation or additional time for completion which are based on lack of knowledge or lack of understanding of any part of the RFP shall not be permitted.

1.23 Proposal Errors and Irregularities

Milford reserves the right to waive minor errors or irregularities in any Proposal if it appears to Milford that such errors or irregularities were inadvertent. Any such errors or irregularities shall be corrected in the Proposal prior to contract execution. Proposals with major irregularities may be considered defective and may be rejected immediately.

1.24 Open Procurement

Milford reserves the right to accept or reject any or all Proposals. Milford may allow a PROPOSER the opportunity to clarify its Proposal prior to rejection.

Milford may reject any or all Proposals in whole or in part and may cancel this RFP or procurement at any time when the rejection or cancellation is in the best interest of Milford as determined by Milford. Milford is not liable to any PROPOSER for any loss or expense caused by or resulting from the rejection or cancellation of a solicitation, Proposal, or award. All timely submitted Proposals will become part of the solicitation file.

1.25 Options

Sections designated "OPTION" identify goods and/or services that **must** be offered by the PROPOSER as options for purchase by Milford at their discretion. Costs for these items are not included in the base cost proposal evaluation. These options may be selected for implementation or inclusion with the initial contract, or at any time during the term of the price guarantee for the price quoted in the Proposal.

2 Proposal Instructions

2.1 Proposal Outline

Proposals shall include the following items in this order:

- **Technical Proposal**
 - Introduction and Letter of Transmittal
 - Table of Contents
 - Point-by-Point Response
 - Responsibilities Response
 - Project Team and References
 - Organization Experience and References
 - Service Shop Experience and References
 - Additional Information
- **Price Proposal**
 - Price Forms
 - Proposal Surety

2.2 Technical Proposal

ABSOLUTELY NO PRICE INFORMATION SHALL BE INCLUDED IN THE TECHNICAL PROPOSAL. TECHNICAL PROPOSALS CONTAINING PRICE INFORMATION MAY BE DISQUALIFIED.

2.2.1 Introduction and Letter of Transmittal

The introduction and letter of transmittal shall provide the necessary certification from the PROPOSER that the signer is authorized to make this Proposal on behalf of the PROPOSER. The letter shall designate by name not more than two individuals authorized to negotiate and sign the contract with Milford on behalf of the PROPOSER. An executive summary may be provided as an attachment to the letter of transmittal. The letter shall contain a description of the scope of the project and the PROPOSER'S general plan for implementation. The letter of transmittal may also briefly set forth any information the PROPOSER wishes to bring to Milford's attention.

2.2.2 Point-by-Point Compliance Response

2.2.2.1 Compliance Matrix

The PROPOSER shall provide a compliance statement by completing the compliance matrix found in APPENDIX B. This document is included in a Microsoft Excel file named "PROPOSER'S Name for *RFP #2021-001 P25 Radio System Appendix B.xls*" available on the Milford procurement website. The PROPOSER shall provide this completed excel file as part of the PDF Proposal submission and in its native Microsoft Excel format. **Failure to provide a soft copy in Microsoft Excel format may result disqualification or loss of evaluation points.**

The compliance spreadsheet provides space for a compliance response and explanation for each section of the RFP. There are three valid responses:

Response	Meaning
Comply	Proposal <i>fully</i> complies with all requirements as stated in the numbered section. * If PROPOSER states Comply and provides an explanation of the compliance, Milford may, at their discretion, consider this an exception.
Exception	Proposal does <i>not</i> comply with requirements of the section. Explain the nature of the exception(s). If you take exception to more than one part of a section, identify the number of exceptions taken and provide explanations for each. Any item not explicitly identified as an exception in the Proposal will be considered compliant.
Not Applicable	This category should <i>only</i> be used if the section does not apply to the PROPOSER'S Proposal or system configuration. <i>Use this with response caution.</i>

Any other response or lack of response will be assumed to be an exception.

2.2.2.2 Additional Instructions

The outline of the Compliance Matrix shall correspond to the outline of the RFP and has been pre-populated accordingly. The PROPOSER may not add or delete line items in this document. If the PROPOSER finds a need to change this document, a request must be made in writing to Milford, and if Milford deems it appropriate to make a change, the document will be re-issued via the RFP Addenda process.

2.2.3 Responsibilities Response

2.2.3.1 Responsibilities Matrix

The PROPOSER shall provide a responsibilities statement by completing the responsibilities matrix found in APPENDIX C. This document is included in a Microsoft Excel document named "PROPOSER'S Name for RFP #2021-001 P25 Radio System Appendix C.xls" available on the Milford procurement website. The PROPOSER shall provide this completed excel file as part of the PDF Proposal submission and in its native Microsoft Excel format. **Failure to provide a soft copy in Microsoft Excel format may result disqualification or loss of evaluation points.**

2.2.3.2 Additional Instructions

The responsibilities response shall contain, at a minimum, the following categories:

- Management
- Detailed Design Review (DDR)
- System Integration
- Site Work
- Tower Work
- Shelter work
- Generators
- System Installation / Optimization
- Acceptance Testing
- Subscriber Equipment

- Training
- Final Acceptance

Additional categories and subcategories may be added, and additional lines within the subcategories may be added. This document will be used throughout the implementation of the project to enhance organization and efficiency.

2.2.4 Qualifications

2.2.4.1 Project Team and References

PROPOSER shall provide information on each core team member's qualifications to include a detailed resume with references and their contact information.

2.2.4.2 Organization Experience and Reference

PROPOSER shall provide information on a minimum of three system implementations of similar size and complexity. Each reference shall include a point of contact that can provide detailed information as to the performance of the PROPOSER.

2.2.4.3 Warranty and Maintenance Service Organization Experience and References

PROPOSER shall provide information on a minimum of three systems the proposed warranty and maintenance service organization has provided services similar in nature and complexity. Each reference shall include a point of contact that can provide detailed information as to the performance of the warranty and maintenance service organization.

2.2.5 Additional Information

Additional instructions are included for PROPOSERS, in some RFP sections, indicated in **bold text** and request specific information to be included in the Proposal, such as details on the feature specified in that section, equipment specification sheets or PROPOSER guarantees.

The outline of the Proposal shall correspond to the outline of the RFP. For example, if PROPOSER instructions are included in section 123.456 of the RFP, the information requested shall be provided in section 123.456 of the Proposal point-by-point response.

2.3 Price Proposal

2.3.1 Price Forms

The PROPOSER shall provide a Price Proposal in the forms shown in APPENDIX D. A soft copy of this form is found in a Microsoft Excel file named "PROPOSER'S Name for *RFP #2021-001 P25 Radio System Appendix D Price Proposal.xls*" available on the Milford procurement website. The PROPOSER shall provide this completed excel file as part of the PDF Proposal submission and in its native Microsoft Excel format. **Failure to provide a soft copy in Microsoft Excel format may result disqualification or loss of evaluation points.**

Failure to fill in all blanks of the Price Forms and to supply all information required may be cause for rejection of the Proposal. Any attempt to modify the structure or formulas in the Price Forms may be cause for rejection of the Proposal. If the PROPOSER finds a need to change the Price Forms, a request must be made in writing to Milford, and if Milford deems it appropriate to make a change, the document will be re-issued via the RFP Addenda process.

If the PROPOSER wishes to provide additional pricing information, the PROPOSER may submit the information on additional sheets and electronic files. In all cases, the hardcopy of the pricing shall be binding.

2.3.2 Proposal Surety

The Price Proposal shall be accompanied by a Proposal deposit in the form of a bid bond, cash bid bond or a certified check payable to the *Town of Milford, New Hampshire*. The amount of the deposit shall be five percent of the base Proposal price. A PROPOSER that submits a certified or cashier's check must complete, sign, and submit the cash bid bond form located in APPENDIX E.

3 General Terms and Conditions

3.1 Proposed Terms and Conditions

PROPOSER: Provide a copy of your proposed terms and conditions.

3.2 Order of Precedence

The following items shall be incorporated by reference into the Contract. These items shall take precedence in the order in which they are listed:

1. Amendments to the Primary Contract Agreement
2. Primary Contract Agreement
3. Detailed Design Documents
4. Payment Milestone & Pricing Pages
5. Project Schedule
6. Performance and Payment Bonds
7. Compliance Matrix, as negotiated
8. Responsibilities Matrix, as negotiated
9. Written clarifications and negotiated resolutions
10. RFP addenda
11. RFP
12. Proposal amendments
13. Proposal

3.3 Pricing and Payment

Payment will be made based upon Contract Execution, Final Acceptance, and Application and Certificate for Payment:

Payment Schedule				
Installation of System	Contract Execution		Conditional Acceptance	Final Acceptance
Services	10%	(To Be Negotiated)		10% Project Closeout
Radio System				
Connectivity Network			10%	
Physical Facilities			Cutover	
Subscriber Units	0%			
Payment Schedule After Final Acceptance				
Warranty and Maintenance	Monthly Payments to be Negotiated After Final Acceptance and Cutover			
Warranty				
Maintenance				

Any payment terms requiring payment in less than 45 days will be regarded as requiring payment 45 days after invoice or delivery, whichever occurs last. This shall not affect offers of discounts for payment in less than 45 days.

The CONTRACTOR may bill monthly with an invoice and attach the required Application and Certificate for Payment. The invoice shall provide detailed deliverable items, e.g. submittals, equipment, services, etc., and

price with retainage. [The Application and Certificate for Payment may use AIA Form G702-1992 and G703-1992 Continuation Sheet, or similar.] CTA will review and certify for payment before approval by Milford.

3.4 Price Guarantee

The CONTRACTOR shall guarantee the quoted prices for all equipment and accessories purchased under the contract (including prices quoted for optional items), and all additional equipment purchased prior to final system acceptance, shall remain valid for a period of two years following final system acceptance.

The CONTRACTOR shall also guarantee that, for the thirteen-year period beginning two years after final system acceptance, the prices for all equipment and accessories purchased under the contract (including prices quoted optional items), and all additional equipment purchased prior to final system acceptance, shall not increase at a rate higher than the U.S. Consumer Price Index.

The CONTRACTOR shall provide Milford a complete commercial price listing for all applicable products and parts manufactured by the CONTRACTOR. The CONTRACTOR shall continue to send this price listing to Milford once every twelve months until asked to discontinue this practice by Milford.

After the price guarantee term expires, options shall be priced in accordance with the price escalation provisions of this RFP. These items, as priced, provide information that Milford requires to make decisions concerning design alternatives, expansion and/or enhancements to the operation of the system design under consideration.

3.5 Contract Security

A Performance Bond and a Labor and Material Payment Bond, each in a sum equal to 100% of the negotiated price and duly executed by the successful PROPOSER as principal and by a surety company qualified to do business under the laws of the State of New Hampshire and to the satisfactory of Milford, as surety, will be required for the faithful performance of the contract, the payment from labor and materials, and for the guarantee and maintenance of the work. The successful PROPOSER shall furnish the Performance and Labor and Material Payment Bonds with the executed contract.

3.6 Contractual Claims

Contractual claims, whether for money or other relief, shall be submitted in writing to the **Town of Milford Contact for Contractual Claims**, no later than 60 days after final payment; however, written notice of the CONTRACTOR'S intention to file such claim shall have been given at the time of the occurrence or beginning of the work upon which the claim is based. The **Name of Applicable Review Board** shall issue a decision regarding such claim, in writing, no later than 60 days subsequent to notification to the **Town of Milford Contact for Contractual Claims**.

For good cause and as consideration for executing this contract, the PROPOSER acting herein by and through the person signing this Proposal on behalf of the PROPOSER as duly authorized agent, hereby conveys, sells, assigns, and transfers to Milford all rights, title and interest in and to all causes of action it may now or hereafter acquire under the anti-trust laws of the United States and the State of New Hampshire, relating to the particular goods or services purchased or acquired by Milford.

3.7 Sales Tax Exemption

Milford is exempt from New Hampshire state sales and use taxes. Milford will furnish the CONTRACTOR a Sales and Use Tax Exemption Certificate prior to the issuance of a notice to proceed. The Proposal shall include all other applicable taxes and fees.

3.8 Liquidated Damages

For each and every day the installation of the system shall fail to be complete beyond the date set for completion of installation and any extensions granted under the contract, the CONTRACTOR shall pay to Milford the total amount of all costs resulting from the delay as liquidated damages and not as a penalty. Liquidated damages may be deducted by Milford from any money due or to become due to the CONTRACTOR as compensation under the contract. Liquidated Damages shall not exceed 5 percent of the total amount of the contract per incident/delay. The total of Liquidated Damages shall not exceed the total cost of the contract.

3.9 Indemnity

The CONTRACTOR shall indemnify and save harmless Milford, its officials and employees from all losses, claims, demands, payments, suits, actions, recoveries, and judgments of every nature and description brought or recoverable against Milford, or by reason of any act or omission of the CONTRACTOR, its agent, or its employees, in the execution of the work, or in consequence of any negligence or carelessness in guarding the same, including all liability for, or growing out of any infringement of letter patent or copyright of the United States, in respect to the normal use of the proposed and installed system. Milford will promptly give the CONTRACTOR notice of any such claim.

The successful PROPOSER shall assume all risk and bear any loss or injury to the property or persons occasioned by neglect or accident during the progress of work until the same shall be completed and accepted. The CONTRACTOR shall also assume all blame or loss by reason of neglect or violation by CONTRACTOR of any state or federal law, Milford code, or municipal rule regulation, or order. The CONTRACTOR shall give to the proper authorities all required notices relating to the work and shall be responsible for ensuring all official construction permits and licenses are obtained prior to the beginning of work, and for paying all proper fees. Milford will sign permit requests as required and as submitted by the CONTRACTOR. The CONTRACTOR shall make good any injury that may have occurred to any adjoining building, structure, or utility in consequence of this work.

3.10 Liability Insurance

The successful PROPOSER shall carry public liability insurance in the amounts specified below, including the contractual liability assumed by the CONTRACTOR, and shall deliver a Certificate of Insurance to Milford (with a copy to Milford with a 30-day cancellation notice provision from carriers acceptable to Milford and licensed to do business in Milford **or [New Hampshire or Hillsborough County]**). The certificate shall be delivered in conjunction with delivery of the executed contract to Milford.

- A. Worker's Compensation and Employer's Liability
 - Coverage A - Statutory Requirements
 - Coverage B - \$100,000 per Occurrence
 - Coverage C - \$100,000 Accident and/or Disease
 - All States Endorsement
- B. Automobile Liability, Including Owner, Non-Owner and Hired Car Coverage
 - \$1,000,000 per accident to include Bodily Injury & Property Damage
- C. Commercial General Liability
 - \$1,000,000 per occurrence / \$2,000,000 aggregate

Commercial General Liability is to include bodily injury and property damage, personal injury, advertising injury, contractual liability, and products and completed operations coverage. Milford, their officers, employees, agents, and volunteers must be named as additional insureds and be so endorsed on the policy, as evidenced by the certificate of insurance.

D. Professional Liability (Errors and Omissions)

\$2,000,000 limit per claim and aggregate

3.11 Assignment

Assignment by the successful PROPOSER to any third party of any contract based on this RFP or any monies due shall be absolutely prohibited and will not be recognized by Milford unless approved by Milford in writing. Approval will not be unreasonably withheld.

3.12 News Release

The PROPOSER shall at no time make any news or advertising releases pertaining to this RFP for any purpose without the prior written approval of the Town of Milford, and then only in coordination with the Town of Milford.

3.13 Transportation and Storage

The CONTRACTOR shall make all arrangements for transportation of equipment in suitable vehicles and by experienced equipment carriers. Supervision of packing, unpacking and placement of equipment shall be furnished by the CONTRACTOR without charge to Milford. The CONTRACTOR shall incur the transportation expenses.

The acquisition of the required storage space will be at the expense of the CONTRACTOR.

Milford will make available to the CONTRACTOR the sites and equipment buildings when they are ready. These will be taken by the CONTRACTOR as is and may be used for storage of contract related equipment. The CONTRACTOR will be responsible for equipment stored and installed at these sites until Milford accepts the equipment.

3.14 Transfer of Title

The CONTRACTOR shall assume full financial and operational responsibility until the system is accepted by Milford. Only at that time will Milford assume responsibility for and take possession of the system. If the CONTRACTOR desires, transfer of title may be effective upon delivery. However, under no circumstances, shall any warranty begin until final acceptance of the system by Milford.

3.15 Non-Discrimination in Employment

During the performance of this contract, the CONTRACTOR shall be governed by all applicable state and federal regulations, and agrees as follows:

- A. The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, religion, color, sex, or national origin. The CONTRACTOR agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.

- B. The CONTRACTOR, in all solicitations or advertisements for employees placed by or on behalf of the CONTRACTOR, will state that such subcontractor is an equal opportunity employer.
- C. Notices, advertisements, and solicitations placed in accordance with federal law, rule or regulation shall be deemed enough for the purpose of meeting the requirements of this section.
- D. The CONTRACTOR will include the provisions of the foregoing paragraphs A, B, and C in every subcontract or purchase order [of over \$10,000], so that the provisions will be binding upon each subcontractor or vendor.

3.16 Employment of Illegal Aliens

The CONTRACTOR shall certify that it does not, and will not during the performance of the contract, knowingly employ illegal alien workers or otherwise violate the provisions of the Federal Immigration Reform and Control Act of 1986.

3.17 Force Majeure

Neither party will be liable to the other for any failure or delay in rendering performance arising out of causes beyond its reasonable control and without its fault or negligence. Such causes may include, but are not limited to, acts of God or the public enemy, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes and unusually severe weather; but the failure or delay must be beyond reasonable control and without fault or negligence. If the CONTRACTOR'S failure to perform is caused by the default of a subcontractor, and if such default arises out of causes beyond the reasonable control of both the CONTRACTOR and subcontractor, and without the fault or negligence of either of them, the CONTRACTOR shall not be liable for any excess costs for failure to perform, unless the equipment or services to be furnished by the subcontractor were obtainable from other sources in sufficient time to permit the PROPOSER to meet the required delivery schedule. Dates or time of performance will be extended to the extent of delays excused by this section, provided that the party whose performance is affected notifies the other promptly of the existence and nature of such delay.

3.18 Site Visits

Ignorance of site conditions shall not relieve the CONTRACTOR of any liability or obligations under the contract.

3.19 CONTRACTOR Responsibilities

The CONTRACTOR shall assume total responsibility for delivery, installation, acceptance, and warranty of all hardware, software, and engineering and support services offered in the Proposal, whether the PROPOSER is the manufacturer, producer, author, or supplier of them.

The CONTRACTOR shall be the sole point of contact regarding all contractual matters, including the performance, service, and payment of any and all charges resulting from the lease and installation of the entire system configuration, and all other services performed. Failure to meet these obligations shall result in the cancellation of any contracts.

3.20 System Responsibility

The PROPOSER shall be responsible for verifying the completeness and suitability of all work or equipment proposed for this system. The CONTRACTOR shall provide any additional equipment or labor required to meet these specifications, without claim for additional payment, it being understood that a complete operating system is required.

The CONTRACTOR shall be responsible for designing, furnishing, and installing all required interfaces with existing systems and equipment, along with such interfaces as might be specified in the system specification, unless such interfaces are specifically excluded or ascribed to others in this specification. The CONTRACTOR shall be obligated to provide a system that meets all guarantees in the Proposal for the price contained therein.

3.21 Property Damage

The CONTRACTOR shall be responsible for any loss or damage to property caused by their operations or personnel. Damages will be settled with the owner of the property by the CONTRACTOR in the company of an agent of Milford. The CONTRACTOR shall submit a signed damage release for all sites concerned within 30 days after the recommendation of cutover.

3.22 System Use before Acceptance

Milford will not use any part of that system for operational use prior to conditional acceptance, other than for training and testing of the system. Conditional acceptance shall be on a system basis only. Once the Acceptance and Coverage Tests have been passed validating all significant functions, features, coverage, and Cutover has been successfully completed, Milford will agree to Conditional Acceptance but will not pay the final milestone until Final Acceptance. Only when the CONTRACTOR has completed all contractual responsibilities and Milford has approved all punch-list items, submittals, as-built drawings, training, maintenance manuals, etc. will Final System Acceptance be achieved.

It may become necessary however, because of unplanned events, for Milford to use a part of, or all the system or a subsystem. Such use shall not constitute conditional acceptance unless it continues for 30 consecutive days. The CONTRACTOR will be entitled to seek relief from any damages for delays which result from such unplanned use of the system or subsystems.

3.23 Retesting

If the CONTRACTOR notifies Milford that a site, system or subsystem is ready for inspection and/or testing at a mutually agreed time and place according to a mutually agreed test plan; and if the site, system or subsystem is inspected and/or tested according to the agreed test plan; and if the site, system or subsystem fails the inspection and/or test and requires retesting at a later date; then the CONTRACTOR shall bear the costs due to rescheduling that may accrue to Milford and CTA, including travel, lodging and compensation at Milford's and CTA's standard rates.

4 Statement of Work

The statement of work applies to all systems, equipment, facilities, services, and software specified in this RFP.

4.1 Project Management

The CONTRACTOR shall have experience with projects of similar size and scope as the proposed system. Assigned personnel shall have qualifications and experience to perform their tasks for this project. An organizational chart with names and resumes for the project manager, lead engineer and key positions, including significant subcontractors and their personnel shall be provided.

4.1.1 Project Manager

The CONTRACTOR shall Designate a single project manager to supervise and coordinate the CONTRACTOR'S work and to act as the primary point of contact for all project-related issues. The CONTRACTOR'S project manager shall direct the CONTRACTOR'S personnel and subcontractors in the project and assist in resolving project problems.

The CONTRACTOR shall provide the project manager's contact information after Milford issues the notice to proceed (NTP). The contact information shall include the following:

- Name
- Mailing address
- Shipping address
- Office phone number
- Cell phone number
- Email address

4.1.2 Changes to CONTRACTOR'S Key Personnel

The CONTRACTOR shall notify Milford prior to replacing key personnel assigned to the project, and shall provide names, resumes and three project references for proposed replacement personnel. Milford has the right to reject proposed key personnel.

4.1.3 Subcontractors

The CONTRACTOR shall notify Milford prior to procuring subcontractor(s) to perform tasks and/or provide equipment on the project. Milford has the right to reject proposed subcontractors.

4.1.4 CONTRACTOR Registration

Firms performing construction work on behalf of the CONTRACTOR shall be licensed with the appropriate authorities. The firms shall be licensed at the time of the submission of the Proposal and must remain licensed through the completion of the work.

The CONTRACTOR and its subcontractors shall have all federal, state, and local licenses necessary to do the work, and shall remain licensed through the completion of the work.

4.1.5 Project Management Plan

4.1.5.1 Project Schedule

The CONTRACTOR shall maintain a master project schedule for the design, implementation, and acceptance of the system. Provide schedule updates to the PROJECT TEAM monthly, or more

frequently as needed, to address changing circumstances. The project schedule shall provide a breakdown of each task, including the following details:

- Start and end dates
- Predecessors and successors
- Responsible party or parties
- Percentage completed
- Critical path

The CONTRACTOR shall update the project schedule regularly to reflect actual task completion dates.

The schedule for the implementation of each communications system site shall be broken out separately.

4.1.5.2 Project Review Meetings and Teleconferences

The CONTRACTOR shall conduct regular monthly project review meetings after the DDR until Final System Acceptance.

The CONTRACTOR shall organize and conduct regular teleconferences between scheduled review meetings.

The CONTRACTOR shall provide a teleconference bridge and inform PROJECT TEAM members of the call-in numbers or web link and access codes.

The CONTRACTOR shall provide an agenda to all invitees before the meeting or teleconference. The agenda for project review meetings and teleconferences shall follow a general outline:

- Review of minutes from last meeting or teleconference
- Activities for previous period
- Current project issues
- New issues and action items
- Plans for next period
- Schedule review
- Action item review
- Risk item review
- Date and time of next meeting or teleconference

The CONTRACTOR shall provide minutes to all attendees and PROJECT TEAM members after the meeting or teleconference.

4.1.5.3 Action Item List

The CONTRACTOR shall develop and maintain an action item list. The action item list shall include the following items:

- Item Number
- Date Identified
- Description of the Item
- Responsible Party
- Resolution
- Date Resolved

4.1.5.4 Project Status Reports

The CONTRACTOR shall submit monthly project status reports to Milford within ten (10) days after the end of the month for the duration of the project. Monthly status reports shall follow this general outline:

- Activities completed during the previous month
- Activities planned or scheduled the next month
- Updated Project Schedule
- Submittal Schedule: Item Status - Planned & Completed
- Red flag items / Risk Issues
- Transmittal log
- Punch-list items

4.1.6 Submittals

The CONTRACTOR shall provide project submittals according to the submittal schedule. A preliminary submittal schedule is found in Table 4-1 (calendar days unless specifically listed business days). **Each of the submittal items below shall be included in the Proposer’s responsibilities matrix.**

Milford will maintain the submittal schedule to identify project deliverables are submitted timely and are complete. The schedule will include the following for each item:

- RFP or contract reference
- Document description
- Scheduled submittal date
- Actual submittal date
- Approval date
- Notes

RFP Section	Submittal	Scheduled Delivery Date (calendar days)
4.1.1	Project Manager's contact information	within 15 days after NTP
4.2.2	Detailed Design Review (DDR)	within 90 days after NTP
4.2.3	Detailed Design Documentation	at the DDR
5.7.2.2	Port and Protocol Information for all devices connecting to the radio system network	at the DDR
4.3.13	FCC Licenses Application(s)	at the DDR
9.13.1	HVAC – Load Calculations	at the DDR
9.13.3	Electrical System – general design with one-line diagram	at the DDR
4.2.3	Approved DDR	after receiving the PROJECT TEAM'S last comments, revisions, and approved by Milford
4.4.4	Draft Coverage Acceptance Test Plan (CATP)	at the DDR
4.4.5	Thirty (30) Day Performance Period Plan	at the DDR; reviewed and approved by Milford at least 30 days prior to Coverage Testing
4.4.6	Cutover Plan	at the DDR; reviewed and approved by Milford at least 30 days prior to Coverage Testing
9.11.5	Existing Tower Assessment, Mapping & Analysis Report	within 60 days after Approved DDR
9.11.12	FAA Notifications	within 60 days after Approved DDR
9.5	Earthwork (Erosion Control, Fills, etc.)	within 60 days after Approved DDR
9.6	Access Road	within 60 days after Approved DDR
9.7	Parking Area	within 60 days after Approved DDR
9.8	Fence Drawings & Catalog Data	within 60 days after Approved DDR
9.15	Grounding Plan Documentation	within 60 days after Approval DDR

RFP Section	Submittal	Scheduled Delivery Date (calendar days)
9.11.4	Structural Analysis - New Tower and Support Antennae, include drawings	within 90 days after Approved DDR
9.5.1	Geotechnical Investigation	within 45 days after performed borings
9.10.1	Design Foundations	45 days after Geotechnical Study Report
9.10.4	Concrete Testing Results	45 days after collection of concrete samples
9.14.1	Typical Generator Specifications with accessories & data sheets	within 90 days after Approved DDR
9.14.2	Typical UPS Specifications with accessories & data sheets	within 90 days after Approved DDR
4.3.11	AM Radio Tower Interference Report	within 120 days after Approved DDR
9.12	Building Drawings including Floor Plans	90 days prior to building delivery
9.13	Building Systems – HVAC, fire alarm, electrical & lighting (design documentation)	90 days prior to building delivery
4.3.15	Fleet Mapping Plan	at least 6 months prior to radio system cutover
4.3.14	Interference Analysis and Mitigation	within 90 days after Approved DDR
4.3.18	Connectivity Network Field Acceptance Test Plan	at least 90 days prior connectivity network field acceptance testing in the field
4.3.19	Radio System Field Acceptance Test Plan	at least 90 days prior to beginning the final radio system field acceptance testing
4.4.3	Final CATP	at least 60 days before scheduled Coverage Test; reviewed and approved by Milford
4.4.2	Connectivity Network Acceptance Test Report & Punch List	within 7 days after completion of connectivity network field testing. When reviewed test report and punch list are resolved, Milford will approve.
6.3.3.1	Self-Interference Test	at least 21 days prior to acceptance testing, submit test results for each channel at each site
4.4.3.1	Base Station Tests	at least 21 days prior to acceptance testing; submit test results at each site
5.8.4	Statement of Compliance with Electromagnetic Exposure limits	within 10 days prior to acceptance testing at a site
4.7.2	Training Materials	at least 30 days prior to the beginning of class sessions
4.4.3	Acceptance Test Report & Punch List	within 14 days after all Acceptance Tests completed (including Failure Modes and Simulcast Alignment testing); resolution of punch list and approval by Milford
4.4.4.7	Acceptance Test Results	within 10 days after completion of the Coverage Testing and approval by Milford
4.6.4	Subscriber Documentation	at least 7 days prior to subscriber training
4.6.1	Standard Manuals	at least 30 days prior Cutover
4.6.2	Physical Facilities As-Built Documentation	same time and coordinated with the final system maintenance documentation
4.6.3	System Maintenance Documentation	at the beginning of the 30-day performance period
3.21	Damage Release Form	within 30 days after recommendation of cutover

Table 4-1 Submittal Schedule

4.1.7 Transmittals

The CONTRACTOR shall assign a unique transmittal identification number to each submittal listed in Table 4-1 and to other significant project-related documentation, such as important memoranda, reports

and change order requests. The transmittal ID number shall consist of an identifier for the sending party and a consecutive serial number for the transmittal. Each transmittal shall include the following information:

- Transmittal ID number
- Date
- Sender
- Organization
- Recipient(s)
- Subject
- List of documents delivered

The CONTRACTOR shall maintain a log of its transmittals and shall include it with the monthly project status report.

4.1.8 Email

Electronic mail may be used for the development of decisions and documentation, and transmission of files. Actual decisions and documentation transmittals shall be transmitted in signed PDF form.

4.1.9 Project Documentation

The CONTRACTOR shall provide and maintain all the project documentation, sharing with the PROJECT TEAM from the beginning to System Acceptance and Cutover. At the end of the project, the CONTRACTOR will hand-off all documentation to Milford for future maintenance (all project documentation pertinent to the definition and implementation of this project, e.g. submittals, transmittals, schedules, agenda, charts, data, diagrams, drawings, photographs, maps, email, licenses, manuals, minutes, permits, procedures, reports, spreadsheets, text files, written plans, etc.).

Documentation shall be provided in both hard and soft copy. USB drive or DVD/CD-ROM copies are preferable and shall be supplied without copy protection. When appropriate, documentation shall be professionally bound in three-ring binders with section tabs and a table of contents. When submitted for approval or information, documents shall be clearly marked with the name of this project, date, and other tracking information, e.g. contract information, site name and/or drawing/document number. The CONTRACTOR may develop a Web-based "cloud drive" to safely store and share documents, drawings, maps, photos with all members from the PROJECT TEAM.

4.1.10 Risk Management

The CONTRACTOR shall identify and assess potential risks to the Project and notify the PROJECT TEAM. If a risk item has developed it should be placed on the action item list to determine its status, impact, and the responsible party.

4.1.11 Change Orders

The CONTRACTOR shall submit change order requests to Milford's Project Manager that modifies quantity, equipment, software, services, schedule, cost, operation, or performance. A separate change order for each request shall include:

- Customer name
- Project number and title
- Issue date
- Tracking number
- CONTRACTOR name
- Reason for change
- Description of change
- Cost impact
- Schedule impact
- Operational or performance impact

No changes to the work shall commence until the change order request has been approved by Milford in writing.

4.1.12 Punch List

The CONTRACTOR shall establish and maintain a punch list for inspections, field tests and acceptance tests. The list will be published monthly to include a sequential punch list item number, site reference, date identified, description of the item, resolution date, and notes. Milford/CTA will be responsible to review and approve the resolution of each item.

4.2 Planning and Design

The CONTRACTOR shall design, engineer, furnish, install, configure, test, and warranty the systems, equipment and software required by the technical specifications of this RFP. The CONTRACTOR shall supply all equipment, software, and services necessary to provide a complete and operational communications system.

4.2.1 Project Kickoff Meeting

The CONTRACTOR shall proceed with project plans and design activities after NTP.

The CONTRACTOR shall conduct the Project Kickoff Meeting at a location provided by Milford for the PROJECT TEAM within 30 days after NTP. The following items shall be discussed at the project kickoff meeting:

- Introductions
- Project Management Plan
 - Project review meetings
 - Project teleconferences
 - Action items
 - Risk Management
 - Submittals
 - Transmittals
 - Punch lists
 - Project status reports
- Project Overview
 - Status of project

- Sites
- Schedule
- Overview Design Plan
 - Content
 - Schedule
- Detailed Design Review Requirements
- Action Item List
- Schedule for meetings and teleconferences

4.2.2 Detailed Design Review (DDR)

The CONTRACTOR shall conduct the Detailed Design Review (DDR) at a location provided by Milford for the PROJECT TEAM.

Provide the agenda at least 10 business days prior to the DDR.

- Technical Design
 - System Configuration
 - System Operations – Features & Functions (in Section 6)
 - Select Sites
 - Coverage Maps (in Section 6)
 - Traffic Loading Analysis (in Section 6)
 - Frequency plan
 - Alarm System Plan
 - System Control and Management
 - Failure Modes
- Connectivity Network Topology
- Interfaces (between radio system, connectivity network and facilities)
- Schedule
- FCC Licenses (Radio System and Connectivity Network)
- Dispatch Center
- Site Design (Physical Facilities)
 - Site Plans
 - Site Access
 - Fencing
 - Towers
 - Building / Shelter Plans
 - Floor plans and Dimensions
 - Electrical System
 - UPS and / or DC Power System
 - Generator
 - Grounding and Surge Protection
 - HVAC
 - Fire detection / suppression
- Project Schedule
- Subscribers
- Fleet Mapping
- Training Plans
- Cutover Plans

4.2.3 Detailed Design Documentation

The CONTRACTOR shall prepare and submit the detailed design documentation to the PROJECT TEAM at the DDR with at least 7 hard copies and 7 electronic copies. Hardcopies provided in notebook form. Large scale drawings shall be folded to fit in a notebook.

The PROJECT TEAM will return comments within 10 business days after the DDR and make appropriate changes within 10 business days after receiving the PROJECT TEAM's comments. Once all comments have been resolved to the satisfaction of the PROJECT TEAM, Milford will approve the DDR, or may approve separately each subsystem, site, equipment, and/or functions prior to manufacture and/or procure by the CONTRACTOR.

4.2.4 Connectivity Network

The CONTRACTOR shall provide the connectivity network required to support the radio system. The CONTRACTOR shall prepare the connectivity network and/or fiberoptic plans under the requirements in Section 7 and provide a part of the detailed design documentation.

4.2.5 Physical Facilities

The CONTRACTOR shall provide the detailed design information on the physical facilities required to support the radio system and connectivity network. This detailed design information includes, but is not limited to the following:

- Space
 - Site Plans
 - Floor Plans
 - Rack Elevations
 - Clearances
 - Antennas
- Electrical
 - Power
 - Voltage
 - Emergency Power
 - Special Receptacles
- HVAC
- Physical Security
- Grounding and Surge Protection
- Mechanical
- Modifications to Existing Facilities
 - Civil
 - Architectural
 - Structural
 - Space
 - Electrical
 - Mechanical
 - Grounding and Surge Protection

The CONTRACTOR shall design and engineer all existing and/or new facilities based on the requirements by Section 9 and includes the following:

- Access Roads
- Site Clearing and Grading
- Fencing
- Towers

- Buildings
- Generators
- UPSs and/or DC Power Systems
- Electrical
- Mechanical
- Fire Detection / Suppression
- Grounding

4.3 Implementation

4.3.1 Permits and Licensing

The CONTRACTOR is responsible to obtain the appropriate federal, state, and local zoning, environmental, special use and construction approvals, permits and licenses necessary for the construction of physical facilities. The CONTRACTOR shall pay all fees and costs associated with obtaining all approvals, permits and licenses.

4.3.2 SHPO and NEPA Studies

The CONTRACTOR shall perform SHPO and NEPA studies where required for selected sites.

4.3.3 Coordination with Milford's Operations

The CONTRACTOR shall coordinate all work with Milford's operating and scheduling requirements. It may be required that certain tasks, such as installation, testing and/or cutover, will need to be performed outside Milford's normal working hours.

4.3.4 Infrastructure Equipment Orders

The CONTRACTOR shall submit factory orders and/or purchase material orders for infrastructure equipment only after Milford has approved the detailed system design and authorized factory or material orders. Milford accepts no responsibility for infrastructure equipment orders placed prior to approval of the detailed design.

4.3.5 Subscriber Equipment Orders

Except for a nominal quantity for testing purposes, all subscriber equipment and accessories shall not be ordered until after the infrastructure equipment has been shipped from the factory and Milford has authorized the CONTRACTOR to proceed with subscriber equipment orders. Under no circumstances will Milford accept subscribers placed in storage at the convenience of the CONTRACTOR.

4.3.6 Relocation of Existing Equipment

The CONTRACTOR shall assist Milford in identifying existing equipment that must be relocated or removed to accommodate new equipment required by this RFP. The CONTRACTOR shall pay any expenses related to existing equipment relocation or disposition of property. If there is any relocation of existing equipment, it must be approved by Milford prior to relocating.

4.3.7 Equipment, Systems and Software

The CONTRACTOR shall furnish all systems, equipment and software required by this RFP.

The CONTRACTOR shall provide all proprietary and third-party software necessary for overall system operation, including, but not limited to, all interface protocols, interoperability protocols, backbone and network interconnections, auxiliary equipment, subsystem interfaces and communications links.

4.3.8 Installation

The CONTRACTOR shall install all systems, equipment and software required by this RFP.

The CONTRACTOR shall leave all sites in a neat, presentable condition throughout the project. The CONTRACTOR shall remove all rubbish, temporary structures, and equipment generated or used by the CONTRACTOR after installation and prior to acceptance.

4.3.9 Utilities

4.3.9.1 Temporary Electrical Power

The CONTRACTOR shall pay all installation fees for any temporary electric power (in Section 9) and electric bills required for site work until the temporary electric power is discontinued.

4.3.9.2 Permanent Electrical Power

For a new site (greenfield), the CONTRACTOR shall pay all installation fees for electric power (in Section 9) and electric bills until system acceptance.

4.3.10 Inspect Excavations

The CONTRACTOR shall notify Milford and the PROJECT TEAM of any excavation at a site 15 days prior to completion of the excavation. Milford and the PROJECT TEAM reserves the right to inspect excavations, rock, socket, and reinforcement placement.

4.3.11 Existing AM Radio Station Towers

The CONTRACTOR shall ensure that tower construction or alteration shall not disturb the antenna radiation patterns of existing AM broadcast stations.

At the detailed design review, the CONTRACTOR shall provide a report of its initial survey identifying all sites requiring tower construction or alteration that are within 1 km of existing non-directional AM stations and within 3 mi of directional AM stations.

The CONTRACTOR is responsible for pre-construction analysis, and/or remediation of interference resulting from the construction or alteration.

The CONTRACTOR shall provide documentation for each site, prior to inspection, to either guarantee no interference with existing broadcast antenna patterns or detail the tower detuning required and the test results confirming that detuning corrected the problem.

4.3.12 Generator Maintenance and Service

The CONTRACTOR shall conduct routine maintenance and operational testing of backup/standby generators until System Acceptance. Following installation, backup/standby generators shall be exercised to at least 30 percent of nameplate rating for 60 minutes, at least once per month.

After the successful completion of the 30-day performance test, the CONTRACTOR shall provide a "preventive maintenance" service contract to Milford for a period of one year starting on the day of Final

System Acceptance execution. The contract shall include all routine preventive maintenance required by the manufacturer, with the exception that weekly and monthly inspections of batteries will be excluded.

4.3.13 Frequency Licensing

The CONTRACTOR shall select frequencies and prepare all required FCC license applications to include Microwave, LMR and DVRs. Milford will sign and submit (Regional Plan documentation,) FCC application and pay coordination and license fees.

Planning for the new radio system, the CONTRACTOR shall perform any modification to existing FCC licenses, that will require coordination and preparation of FCC applications, submittals, and documentation.

4.3.14 Interference Analysis and Mitigation

The CONTRACTOR shall verify that all equipment is operating within the bounds of Milford's FCC license, regulations, and published equipment specifications.

The CONTRACTOR shall identify equipment and analyze collocated RF equipment and the new system to discover potential sources of intermodulation, spurious emissions, transmitter noise or receiver desensitization. The CONTRACTOR shall provide a report on this interference analysis and include a description of the steps taken to minimize potential interference.

The CONTRACTOR shall cooperate with Milford to resolve interference to or from collocated equipment. The CONTRACTOR will be responsible for resolving interference at no cost to Milford if these criteria are met:

- the interference is reported before the expiration of system warranty
- the collocated equipment was licensed prior to the DDR
- the collocated equipment is operating within the bounds of its license, FCC regulations and published equipment specifications

4.3.15 Fleet Mapping

The CONTRACTOR shall assist Milford in developing a fleet map for the radio system, with unique templates for each department or agency. Fleet mapping should also include radio ID structure and programming schedule for the new P25 conventional subscriber units. Milford will be responsible for establishing standard operating procedures. The CONTRACTOR shall provide a preliminary fleet map to Milford at least 6 months prior to radio system cutover.

4.3.16 Draft Acceptance Test Plan

The CONTRACTOR shall provide the draft Field Acceptance Test Plan (FATP) to the PROJECT TEAM at the Detailed Design Review (DDR) meeting. The testing shall demonstrate proper operation of system features and functions, including fault management functions. All subsystems and equipment shall be exercised during acceptance testing.

All subsystems and equipment shall be installed, configured and operational prior to starting the field acceptance tests. The ATP shall follow this basic outline:

- A. Methods: Describe the test sequence, objectives, and steps
- B. Procedures: Detailed test procedures required equipment and step-by-step instructions
- C. Data Collection and Reduction
- D. Results

4.3.17 Shipment and Storage

After notification that sites are ready to install fixed network equipment, Milford will authorize the CONTRACTOR to ship equipment to the radio sites.

4.3.18 Connectivity Network Field Acceptance Test Plan

The CONTRACTOR shall provide the draft Connectivity Network Field Acceptance Test Plan to Milford at least 90 days prior to testing. Milford's representatives will witness the Connectivity Network Field Acceptance Test. The CONTRACTOR shall perform careful testing to ensure that the RF path performance and end-to-end voice/data circuit performance requirements are measured and documented. The end-to-end performance tests shall specifically include BER and packet data tests in normal and protected configurations.

The CONTRACTOR shall notify the date to Milford at least 30 days prior to the Connectivity Network Field Acceptance Test. The Acceptance Test shall not begin until Milford has approved the Connectivity Network Field Acceptance Test Plan.

Milford's representatives will inspect the connectivity network equipment and witness the tests. At completion of the tests, the CONTRACTOR shall provide the following:

- Authenticated equipment inspection and test documentation dated, notes and 3 signatures (or initials) for two Milford's representatives and the CONTRACTOR for each test procedure and the results.
- A punch-list from failed tests and resolution.
- When the punch-list is satisfied, Milford will approve the Connectivity Network Field Acceptance Test.

4.3.19 Radio System Field Acceptance Test Plan

The CONTRACTOR shall provide the Final Radio System Field Acceptance Test Plan (ATP) to the PROJECT TEAM at least 90 days prior to beginning the Radio System Field Acceptance Tests. Field testing shall include all functions, operations, features and failure mode tests required to demonstrate that the system performs as designed.

4.4 System Acceptance

4.4.1 Inspections

Milford will conduct site inspections during construction and a Final Inspection at each site. Deficiencies identified by inspections will be recorded as punch-list items.

4.4.1.1 Facility Inspection and Testing

The CONTRACTOR shall notify the PROJECT TEAM when physical facilities will be complete and ready for inspection at a site, prior to installation of infrastructure equipment. All site, building, fence, parking, commercial power, backup power, HVAC, grounding, and tower construction shall be installed in a neat and professional manner, employing the highest standard of workmanship and in compliance with applicable standards.

The CONTRACTOR shall conduct tests for all facility operations at each site, including testing generator and automatic transfer switch, fire alarm system, HVAC operations, minor and major alarms, etc. Milford will inspect each site, witness testing operations, and update the project punch-list.

4.4.1.2 Final Inspection of Radio Equipment

The CONTRACTOR shall notify the PROJECT TEAM when radio / connectivity infrastructure equipment installation and configuration is complete. Milford will inspect equipment installation and prepare a punch-list of items required.

The CONTRACTOR shall respond to and resolve punch-list items before acceptance testing begins. Exceptions may be waived for punch-list items that do not affect radio system performance. Milford will record the resolution of punch-list items.

4.4.2 Connectivity Network Field Acceptance Testing

Upon completion of installation and final alignment, the CONTRACTOR shall perform and record data in accordance with the collection/analysis process agreed to in the ATP. Additional tests shall be required for connectivity network equipment including the following:

- Battery/Charger Equipment
- Antenna System Equipment
- Fiber-optic links
- Microwave path tests
- Microwave system end-to-end verification
- Loopback testing between sites
- Leased connectivity line testing
- Fiber Link End-to-End Verification
- Optical Transport Acceptance Tests

Milford representatives will inspect the equipment and witness the field acceptance tests. At completion of the connectivity network acceptance tests, the CONTRACTOR shall provide the following:

- Installed equipment inspection and test documentation dated, notes and 3 signatures (or initials) for two Milford representatives and the CONTRACTOR for each test procedure and the results.
- A punch-list from failed tests and resolution.
- When the punch-list is satisfied, Milford will approve the connectivity network acceptance tests.

4.4.3 Radio System Acceptance Testing

4.4.3.1 Base Station Tests

The CONTRACTOR shall perform base station tests after equipment installation, configuration, and submit test results 21 days prior to acceptance testing. Base station tests shall include:

- Transmitter frequency
- Transmitter deviation or modulation integrity
- Transmitter forward and reflected power
- Combiner forward and reflected power
- Receiver frequency
- Receiver static (unfaded) sensitivity (in Section 6) for each channel
- Local operating controls

If the system includes satellite receivers, the Contractor shall perform the receiver tests, and submit results as well.

Milford will randomly select base stations and receivers to witness re-tests and confirm results. If any test fails, a punch-list may require resolution before continuing the Acceptance Tests.

4.4.3.2 Field Acceptance Testing

The CONTRACTOR shall perform the radio system acceptance test after the ATP has been approved by Milford and after installation with resolved punch-list items. Milford representatives will inspect the equipment and witness the field acceptance tests. At completion of the radio system acceptance tests, the CONTRACTOR shall provide the following:

- Installed equipment inspection and test documentation dated, notes and 3 signatures (or initials) for two Milford representatives and the CONTRACTOR for each test procedure and the results.
- A punch-list from failed tests and resolution.
- When the punch-list is satisfied, Milford will approve the radio system acceptance tests.

4.4.3.3 Failure Mode Testing

The CONTRACTOR shall demonstrate failure mode operation of the system during acceptance testing. All equipment and components, both main and standby, shall be exercised during testing.

All standard system functions and failure modes, including continued system operation during major failures, shall be demonstrated. Alarm functions shall also be demonstrated.

4.4.3.4 Simulcast Alignment Testing

If a simulcast system is proposed, after the simulcast system has been properly aligned, the CONTRACTOR shall perform a bit-error rate (BER) test to verify proper alignment.

The CONTRACTOR shall provide maps of predicted coverage overlap areas. A test drive route shall indicate an adequate sampling within these areas. All sites shall be keyed continuously on a single channel, which is modulated with a common audio signal.

4.4.4 Coverage Acceptance Testing

The CONTRACTOR shall submit the draft Coverage Acceptance Test Plan (CATP) at the DDR. The PROJECT TEAM will review the CATP and Milford will approve the CATP at least 60 days prior to begin coverage acceptance testing.

Coverage testing shall be performed during full foliage between May through September.

The CATP shall follow all requirements from Radio System Coverage (in Section 6). The CATP shall use a voice test to determine passing or failing. The CONTRACTOR may measure signal strength and bit error rate (BER), but this data will only be used "for information" and will not affect the Coverage Acceptance Test.

Based on the CONTRACTOR'S input, each service area will be divided into a grid pattern with test tiles, and use the TSB-88 Estimate of Proportions analysis to determine the number and size of the test tiles to ensure a statistically valid results for each service area.

Tests will be performed for both talk-in and talk-out directions, but talk-in and talk-out paths will record results separately and determine separate statistics.

Tests will be performed while in motion.

At each test tile, a single attempt will be made to access the system by pressing the push-to-talk button (automatic re-tries are allowed). If the test radio does not receive a channel grant tone in that tile, the access test for that location has failed.

Testing will be performed using mobile radios provided by the CONTRACTOR under the Contract. Where the coverage requirement is for a portable service area, attenuators and (if necessary) circulators will be used to emulate the portable radios mounted on the hip.

The scoring shall be conducted by a voting “team” consisting of one representative each from Milford, the Consultant (CTA), and the CONTRACTOR. The three voting representatives will each listen to the message for each test tile. Two out of three votes shall determine whether a test tile is passed or failed.

The “field team” will test the talk-out path requiring three voting representatives (Milford, CTA, and CONTRACTOR) inside the vehicle [and a fourth person for the driver]. [OPTION: The driver is ineligible to vote.]

The “base team” will test the talk-in path requiring three voting representatives (Milford, CTA, and CONTRACTOR) at the Dispatch Center with an IP Console or a control station.

In order to “Pass” a test tile, you must be able to receive the entire message, meaning “every word”. If a word is lost, or the test team are unable to understand a word by missing a single syllable, they will vote to “Fail” a test tile.

The voice test messages must be spoken clearly with good diction, using unique sentences or phrases with 6 to 15 words taking about 3 to 8 seconds.

OPTION: The CONTRACTOR may record audio messages (talk-out path) for the mobile radio in the vehicle and use a GPS to record location information (e.g. test tile) and time, and retain this information as part of the permanent file. The CONTRACTOR or Milford may also record audio messages (talk-in path) at the Dispatch Center. If these audio recordings are available, it may be used in any appeal that arise if the system fails to meet the coverage guarantee.

4.4.4.1 Accessible Test Tiles

Test tiles will use publicly accessible roads and will not require 4-wheeled drive vehicles to navigate. There is no special permission required from entities (other than Milford) to enter a tile, and the field team will determine if it is safe to enter the tile. The CONTRACTOR will test all accessible test tiles within the service area.

4.4.4.2 Inaccessible Test Tiles

Inaccessible test tiles will not be included in the calculations of system coverage performance.

4.4.4.3 Tile Retries

Tiles that fail the initial talk-in or talk-out test may be retried. Re-scoring will be performed with the same procedure. The number of tiles that are deemed passing as a result of a retest shall not exceed 5% in any service area.

4.4.4.4 Retry Location

Test retries will be conducted in the same test tile.

4.4.4.5 Coverage Retesting

In the event the coverage test fails to meet the coverage guarantees, the CONTRACTOR shall make corrections and perform a coverage re-test.

All costs for re-testing, including those incurred by Milford for its personnel, CTA and other CONTRACTORS, and any direct expenses (including travel, lodging, meals, etc.), shall be borne by the CONTRACTOR.

4.4.4.6 OPTION: Critical Building Coverage Testing

The CONTRACTOR shall perform coverage testing in each of the critical buildings shown in Section 6 Table 6-5 Critical Buildings. Coverage testing will be witnessed by Milford representatives and / or CTA. If coverage within a building is found unacceptable, Milford may decide to exercise the option to install a distributed antenna system in that building. When the distributed antenna system has been installed, the CONTRACTOR will retest the building witnessed by Milford representatives and / or CTA. Testing shall be performed at locations identified previously to verify that coverage deficiencies have been satisfied.

Tests shall be performed on the first floor (above ground) and at a minimum of one location per 2,000 sq ft for buildings of up to 40,000 sq ft, and one location per every 10,000 sq ft with a minimum of 20 points tested for buildings larger than 40,000 sq ft.

Tests shall also be performed on each level above the first floor and tested below levels (underground). The PROJECT TEAM will determine the number of test locations for each level above and/or below first floor.

4.4.4.7 Acceptance Test Results

Contractor shall provide a comprehensive report detailing the results of all acceptance testing to Milford for approval 10 business days prior to the beginning of the Thirty Day Performance period. Milford will review and reject or approve within 10 business days.

4.4.5 Thirty (30) Day Performance Period

Thirty Day Performance Period will not begin prior to Milford approval of all acceptance test results.

A successful performance period shall consist of 30 consecutive days of successful uninterrupted operation after the completion of field acceptance testing. During the performance period, the CONTRACTOR shall maintain records of any equipment failures and readjustments made. During this period of "system burn-in", some minor equipment failures should be expected. The performance period shall be considered interrupted if any of the following conditions:

- The system experiences a major failure, as defined in the specifications
- The same device fails more than twice during the performance period
- A failure is not responded to within the time specified by the Warranty

If the 30-day performance test is interrupted by any of the above conditions, the CONTRACTOR shall correct the deficiency and begin the 30-day performance test again, starting at day one of the test. Milford will not accept 30 cumulative days instead of 30 consecutive days for passing this test.

The performance period will not be considered interrupted by mutual agreement, or downtime due to causes beyond the reasonable control of the CONTRACTOR. Downtime will not be counted as part of the performance period.

Subject to approval of Milford, as a written exception, coverage performance testing may be concurrent to the 30-day performance period.

4.4.6 System Cutover

The CONTRACTOR shall prepare a plan for cutting over Milford's operations from the old radio system(s) to the new radio system. The draft cutover plan shall be provided at the DDR. The cutover plan shall address the following items:

- Fixed equipment cutover
- Interfaces with and transfer of control from existing systems and equipment
- Dispatching transitions
- Subscriber equipment installation and programming
- Special sequences
- Scheduled downtime
- Dual operation of old and new systems
- Personnel schedules
- Training
- Fallback plans in case of problems or failures

When the Acceptance Testing, Coverage Testing and the 30-day performance period has been successfully completed, and Milford has approved the Cutover Plan, Milford will authorize the day and time to cutover.

Cutover from the existing radio system to the new radio system shall be planned to minimize disruption to Milford's operations.

4.4.7 Conditional Acceptance

Milford may provide "Conditional Acceptance" after the following items have been successfully completed and approved:

- inspections
- connectivity network testing
- field functional testing
- failure mode testing
- radio coverage testing
- 30-day performance testing
- System cutover

After conditional acceptance, the first year of maintenance and warranty on the system can begin.

4.4.8 Final System Acceptance

Milford will provide "Final System Acceptance" when all project punch-list items resolved and approved, all submittals (including as-built documentation, maintenance & operational manuals, etc.) are delivered and accepted, and all services have been satisfactorily performed.

4.5 Subscriber Equipment Programming, Installation, and Issuance

4.5.1 Subscriber Equipment Programming

The CONTRACTOR shall develop templates based on the fleet map in coordination with Milford and program subscriber units.

4.5.2 Mobile Radio Equipment Installation

The CONTRACTOR shall install all new mobile units, vehicular equipment, chargers, and requested accessories. Installation responsibilities shall include removal, as required, of existing equipment after system cutover.

4.5.3 Control Station Equipment Installation

The CONTRACTOR shall install all new control station equipment with transmission line, antennas, remotes (if required), and requested accessories.

Milford will provide the exact locations for equipment to the CONTRACTOR and coordinate with installation.

4.6 Documentation

4.6.1 Standard Manuals

The CONTRACTOR shall provide operational and maintenance manuals for each model of fixed equipment with shipment. The required quantities are as follows:

Number of Units Purchased	Number of Manuals Required
≤20	Five hard copies One electronic copy
>20	One additional hard copy for each 10 additional units

Manuals shall be complete, self-contained and of the same revision level as the equipment provided.

The CONTRACTOR shall provide Milford with an electronic subscription to the latest equipment manuals and technical service bulletins for a period of five years after system acceptance.

4.6.2 Physical Facilities As-Built Documentation

The CONTRACTOR shall submit two draft hard copies of all facilities as-built documentation to Milford for review and approval.

The CONTRACTOR shall provide two bound hard copies of the final versions of physical facilities as-built documentation to Milford at the same time as, and coordinated with, the maintenance documentation. The CONTRACTOR shall provide five sets of as-built documentation in electronic format via USB flash drive.

Physical facilities/site construction as-built drawings include, but are not limited to, the following:

- Site layout drawings
- Floor plans
- Site grounding drawings
- Building elevation detail drawings with foundations
- Building layout drawings
- AC and DC electrical distribution drawings
- Site utility connection details
- Fence installation details

- Foundation details for shelter, towers, and LPG tank
- Site lighting details
- Fire detection/suppression system drawings
- Tower design detail drawings including light controller wiring
- Antenna, combiner, coax line and antenna placement drawings
- Equipment layout drawings
- Equipment/rack elevation profiles
- Console operator position layout drawings
- Equipment shelter plans: providing AC distribution, lighting, grounding, HVAC, and cable ladder details

The CONTRACTOR shall provide one bound hard copy at each site, including the Dispatch Center and the backup Dispatch Center.

4.6.3 System Maintenance Documentation

The CONTRACTOR shall provide system maintenance documentation to allow a properly trained technician to understand, configure, maintain, troubleshoot, and repair the radio system. System maintenance documentation includes, but is not limited to the following:

- System operational description, including a description of the function of each major system component, circuit types and signal flow between system components
- System interconnection drawings and block diagrams depicting system architecture
- Numbering and labeling of all interconnecting cabling
- Pin-out of all cabling connectors
- Numbering and labeling of all connections to punch blocks
- System interconnection and installation documentation as required for vendor equipment and/or physical facilities
- Complete list of all major fixed equipment by model number and revision code and installed firmware/software with revision (configuration control) numbers
- A chart or list of software and firmware version numbers, programming parameters and jumper configurations as they apply
- Record of any telephone circuits interconnected with the equipment by circuit number and telephone number
- System level setting procedures and a log of level settings for all control circuits
- Measured levels of alignment, including level-setting block diagrams and logs of all level settings necessary for setup, alignment, and maintenance activities
- Standard operations and maintenance manuals for all equipment and systems
- Equipment floor layouts and rack elevations
- Detailed HVAC heat load and electrical load calculations

The CONTRACTOR shall provide Milford with two hardcopy sets of draft system maintenance documentation at the beginning of the 30-day performance period.

Milford will provide comments, recommendations, and corrections to the system maintenance documentation.

The CONTRACTOR shall address these comments, recommendations, and corrections to the satisfaction of Milford.

The CONTRACTOR shall provide the following quantity of final system maintenance documentation within 30 days after the completion of the 30-day performance period:

- One set per system site in hard copy
- One set per system - Dispatch Center, Backup Dispatch Center and Maintenance Shop in hard copy
- Two additional sets in hard copy
- Five sets on USB flash drives as PDF files

4.6.4 Subscriber Documentation

The CONTRACTOR shall supply the following with each subscriber unit purchased:

- One standard operator’s manual
- One customized quick reference, a small laminated guide that can be referenced in the field
- One customized quick reference customized for Milford’s radio system

In addition, The CONTRACTOR shall supply five copies of each manual or reference documentation in electronic format.

During warranty and subsequent maintenance contracts, supply addenda as needed to the standard operator’s manual and standard quick reference.

4.7 Training

4.7.1 Types of Training

The CONTRACTOR shall provide the types of training specified below to the indicated number of personnel:

Agency	Number of Trainees	Training Required
Milford Police	30	Radio User Training
Milford Fire	48	Radio User Training
Milford Ambulance	50	Radio User Training
Milford Public Works	23	Radio User Training
Total	151	Radio User Training
Milford Dispatch Center	15	Console User Training
Milford Police	3	System Administrator Training

When multiple training sessions are required, each session should be given during a different week to compensate for scheduling conflicts. Provide the following details on the training offered:

- Course outline
- Recommended class size
- Recommended number of sessions
- Estimated duration
- Class schedule
- Class location

4.7.2 Training Materials

The CONTRACTOR shall provide all training materials, manuals, schematics, and other documentation.

Customize radio user and console operator training and training materials, including any quick-reference guides, to Milford's system configuration. Provide draft training materials 30 days prior to the beginning of class sessions for Milford's review and approval.

Milford will review radio user and console operator training course content and materials and provide comments. When all comments have been addressed, Milford will approve course content and materials prior to beginning class sessions.

4.7.3 Travel and Lodging

Milford prefers on-site training during implementation and prefers to limit travel by personnel for training. Milford will be responsible for travel and lodging expenses incurred by Milford's personnel, if appropriate, in the course of the training program.

4.7.4 On-the-Job Training

Milford's technicians may work alongside with the CONTRACTOR'S personnel during installation, configuration, testing, and warranty during this project.

4.7.5 Training Descriptions

The use of audio and visual aids, as well as actual equipment demonstrations, is required for all courses. Milford will not accept a course consisting primarily of a trainer lecturing trainees.

The CONTRACTOR shall provide professionally produced training manuals to all students. The training manuals shall be furnished to Milford for continuing education purposes. The manuals shall contain clean, legible copies of all written material and visual aids used by the instructor.

4.7.5.1 Radio User Training

Target audience: Radio users

Location: On-site using installed equipment

Schedule: Prior to system cutover

Duration: One to two hours

Description:

- Basic overview of the radio and P25 radio system operation
- Emphasis on types of mobile and portable equipment provided with Milford's system
- Includes distribution and review of laminated quick-reference guide to be provided with each subscriber unit

The CONTRACTOR shall provide "User Evaluation Forms" and instruct each student in their use.

4.7.5.2 Radio User Web Based Training

The CONTRACTOR shall provide web based interactive training sessions that incorporates the above described radio user training. Pricing shall be provided on a per-seat basis.

4.7.5.3 Train-the-Trainer

Target audience: Primarily those who will be responsible for training field personnel, service personnel, dispatchers, and all other radio system users.

Location: On-site using installed equipment

Schedule: Prior to system cutover

Duration: Two to Four Hours

Description:

- Train-the-trainer for radio users
- In-depth training on the system configuration, operational modes, and the features and functionality specific to Milford's system
- Special emphasis on hands familiarization and operation with all types of mobile, portable and control station equipment furnished with the new system
- Includes distribution and review of a laminated quick-reference guide to be provided with each subscriber unit

The CONTRACTOR shall provide "User Evaluation Forms" and instruct each participant in their use.

4.7.5.4 Console Operator Training

Target audience: Dispatchers, supervisors, and system managers

Location: On-site using Milford's operational consoles, with no more than two people on a console

Schedule: Prior to system cutover

Duration: Four to eight hours

Description:

- Hands-on familiarization with console operation, including all features and functionality of the console or those which Milford is implementing.
- An overview of Milford's system and a discussion on the operational theory of the system.
- Hands-on familiarization with the use of the backup control stations furnished with the new system.

The CONTRACTOR shall provide "User Evaluation Forms" and instruct each participant in their use.

4.7.5.5 Radio System Administration and Management Training

Target audience: Engineers, supervisors and managers involved in radio system administration, management, and control.

Location: Typically, at the factory

Schedule: After the detailed design review (DDR) and prior to fleet mapping. This will allow Milford to plan for all the system operations, features, and operations more effectively.

Duration: As recommended by the CONTRACTOR

Description:

- May require multiple courses

- At the end of the training, the participants will be able to administer and manage the radio system. The training should include a system overview and theory of operation of the entire radio system.
- Hands-on training for the system management, support equipment, and support functions of the radio system.
- Database management.
- System programming, including console configuration and subscriber equipment programming.
- System management.

4.7.5.6 Radio System Maintenance Training

Target audience: Radio System maintenance technicians and supervisors

Location: Combination of radio system factory training or on-site formal training

Schedule: During radio system implementation

Duration: As recommended by the CONTRACTOR

Description: Training shall be sufficient to enable a competent radio technician to troubleshoot, align, maintain, and program all subscriber and/or fixed network equipment to the board level.

4.7.5.7 Connectivity Network Maintenance Training

Target audience: Connectivity Network maintenance technicians and supervisors

Location: Combination of connectivity network factory training or on-site formal training

Schedule: During connectivity network implementation

Duration: As recommended by the CONTRACTOR (or subcontractor)

Description: Training shall be sufficient to enable a competent connectivity technician to troubleshoot, align, maintain, and program connectivity network equipment to the board level.

4.8 Warranty and Maintenance

4.8.1 Warranty

The CONTRACTOR shall warrant the systems, equipment, software, and services provided under the Contract against failures, errors or defects in operation, materials, and workmanship for a period of at least one year after System Acceptance. The CONTRACTOR shall warrant all standard physical facilities, e.g. new constructed towers, equipment shelters, generators, HVAC, etc.

The CONTRACTOR shall provide a list of physical facilities and equipment that will offer standard warranty beyond one year. (As an example, new towers should include standard 5 years warranty.)

The CONTRACTOR shall repair, replace, or otherwise correct defective systems, equipment, or software during the warranty period at no cost to Milford.

If a device fails more than twice during the warranty period, the CONTRACTOR shall explain such failures to Milford. If these failures indicate that the equipment is prone to continuing failures, the CONTRACTOR shall replace such equipment at no cost to Milford.

4.8.2 New Equipment Purchases

Equipment purchased after system acceptance shall be covered by its particular warranty period. Maintenance contracts shall accommodate new equipment on a prorated basis from the date of installation to the expiration of the term of the maintenance contract in place at that time.

4.8.3 System Life-Cycle Support

The CONTRACTOR shall support the system, including the connectivity network, for a period of 15 years after Contract Execution by offering at reasonable cost the following:

- Hardware and software fixes and upgrades for the system
- Professional and timely service and repair
- Immediate availability of new parts, materials, and equipment
- Design and engineering counsel
- Any other support as is customary and expected of a service-oriented business

4.8.4 Maintenance Contracts – Years 2-15

The CONTRACTOR shall provide maintenance for all systems, equipment and software provided under this contract. Maintenance contracts shall be renewable yearly beginning at the end of system warranty for years 2 through 15.

4.8.5 Maintenance Services

The CONTRACTOR shall provide the following maintenance services during the warranty and subsequent maintenance periods.

4.8.5.1 Hardware Maintenance

4.8.5.1.1 Service Plan

The CONTRACTOR and Milford shall develop a service plan that includes the following:

- Contact names and phone numbers
- Procedures for reporting service problems
- Procedures for reporting problem resolution
- Escalation procedures

4.8.5.1.2 Preventive Maintenance

The CONTRACTOR shall provide regularly scheduled preventive maintenance as recommended by equipment manufacturer(s). Performance of systems, equipment, and subscriber units shall be maintained to original specifications.

Preventive maintenance that may affect normal operation of the system shall be performed at a time agreeable to Milford and may be outside regular business hours at no additional expense to Milford.

Verification of simulcast alignment shall be performed on a routine basis.

4.8.5.1.3 Subscriber Units

The CONTRACTOR shall pick up defective subscriber units from a central location, be responsible for repairing units, and is responsible for providing any parts necessary for repair. If the unit cannot be repaired, CONTRACTOR will provide a new unit equivalent or better at no additional charge.

4.8.5.2 Emergency Service

Emergency service is reactive maintenance to address any loss of functionality in the radio infrastructure and its supporting equipment.

4.8.5.2.1 Availability

Emergency service shall be available 24 hours a day, seven days a week, including weekends and holidays.

4.8.5.2.2 Response Times

A qualified technician shall respond to requests for emergency service within the following time frames:

Failure Type	Time of Notification	Response Time
Major Failure	Any time	Technician shall respond within two (2) hours. If a problem cannot be resolved remotely, a technician shall respond to the location of failure within four (4) hours
Minor Failure	00:00-12:00	Same business day – overtime if needed
Minor Failure	12:01-24:00	Next business day – start job in the morning

Response times for all minor failures shall be the same during the 30-day performance test period. Response times are measured from the time the failure is reported. No equipment shall be out of service more than 24 hours after failure notification.

The following are considered major failures:

- loss of functionality of an entire site
- failure of the alarm system to report any alarms within its designed alarm reporting cycle
- failure of any radio channel
- failure of any console in the system
- loss of simulcast capabilities at any site (if a simulcast system is proposed)
- a continual bit error rate (BER) greater than 1E-6 on any link in the radio system's connectivity network
- a continual packet loss on any link in the radio system's connectivity network
- a loss of signal on any microwave hop

A minor failure is any failure not classified as a major failure.

4.8.5.3 Software Maintenance

4.8.5.3.1 Corrective Upgrades

The CONTRACTOR shall provide, at no additional cost, corrective upgrades to system and subscriber software. The availability and frequency of corrective upgrades shall be at the discretion of the CONTRACTOR.

When upgrades are made available to Milford, the timing to apply these upgrades will be at the sole discretion of Milford. If deemed necessary by Milford, the CONTRACTOR shall perform software upgrades during evenings or weekends at no additional cost to Milford.

This covers only upgrades by the CONTRACTOR or through its designated Original Equipment Manufacturer (OEM) or Software Provider that are:

- remedies for defective software

- remedies for security vulnerabilities
- new releases that are corrective revisions for earlier versions
- no-cost enhancements to earlier releases

The CONTRACTOR shall ensure that software upgrades do not have a negative impact on other components of the system.

4.8.5.3.2 Enhancements

New software releases that contain enhancements (i.e., new features and capabilities) shall be offered for purchase at agreed upon prices.

The CONTRACTOR shall make every effort to separate corrective revisions from enhancements. If it is unable to do so, and new releases are necessary to correct problem(s), then the entire release (including enhancements) shall be provided to Milford at no additional cost.

4.8.5.3.3 OPTION: Software Enhancement Subscription

The CONTRACTOR shall provide, as an add-on to the maintenance contract, a software update subscription service to keep Milford's equipment operating at the latest version of software.

4.8.5.3.4 Backup Media and Manuals

Backup electronic media and revised software manuals shall be provided at the time of any software revisions to Milford at no additional cost.

All system definition parameters and other unique information (data base) used to operate the system or associated subsystems shall be backed up onto removable media on a quarterly basis during the maintenance period by the CONTRACTOR. The media shall be turned over to Milford for safe, off-site storage. Backup functions shall be designed to run in an unattended mode with no requirement to change media during the process.

4.8.5.4 Technical Support

The CONTRACTOR shall provide remote, phone-based technical support, available 24 hours a day, 7 days a week, including holidays and weekends. This support shall be available to emergency response personnel, the optional support personnel and Milford's own management and maintenance personnel.

4.8.6 Service Organization

Warranty and maintenance service shall be performed only by properly trained and authorized maintenance personnel.

The CONTRACTOR or authorized service organization(s) shall maintain comprehensive installation and instruction manuals for all system equipment. These manuals shall be the property of Milford and shall revert to Milford at such time as Milford assumes the maintenance responsibility for the system.

4.8.7 Service Records

The CONTRACTOR shall document all service performed on the system. For each maintenance service, the documentation shall include the following:

- Time started
- Location
- Name, telephone number and e-mail address of technician providing service

- Service performed
- Parts required to perform service
- Time finished

For each emergency service, the documentation shall include the following:

- Time problem was reported
- Name, telephone number and e-mail address of person reporting problem
- Name, telephone number and e-mail address of technician responding to problem
- Time technician responded to problem
- Description of problem
- Description of problem resolution
- Parts or repairs required to resolve problem
- Time problem was resolved, and resolution was reported to the appropriate Milford contact

Service records shall be available for Milford's inspection upon request. Records shall be maintained by the service organization for the duration of system warranty and any follow-on maintenance contracts and shall revert to Milford upon termination of the warranty or maintenance contract.

4.8.8 Spare Parts

A sufficient supply of spare parts shall be stored at a location to be determined by Milford, to allow immediate restoration of minimal operation of the system on a rolling repair-and-return basis. Other parts shall be available via emergency request and air freighted within twenty-four hours of the equipment failure. The CONTRACTOR may draw upon this spares inventory as necessary during the warranty/maintenance period, replacing equipment as it is used.

At the end of the maintenance contract, the full complement of spares shall be delivered to Milford in a repaired condition.

Further, if during the one-year warranty period, more than 5 percent of repairs are not returned in ten days, the spares inventory counts shall be doubled at no additional cost to Milford. These additional spares shall also be delivered to Milford as specified above. The purpose of this requirement is to ensure that adequate quantities of available spares are maintained on the shelf.

4.8.9 Rolling Repair and Return

Milford's spare parts inventory shall be kept at a location to be determined by Milford, so that a field repair may be quickly made by switching a faulty part for one from the spare parts inventory. The CONTRACTOR shall repair the faulty part and return it to Milford's spare parts inventory.

4.8.10 OPTION: Full-time Service Personnel

The CONTRACTOR shall provide full-time dedicated service personnel for the operation, administration and maintenance of the systems, equipment and software purchased under this contract. These personnel shall be available during normal business hours throughout the year and shall work at the direction of Milford. Substitutes shall be provided when personnel are absent due to vacation, training, or other reasons. Milford will provide workspace, secure areas for storage of spare parts, access to Milford's work order system, landline telephone, laptop computer for programming, desktop workstation for administrative duties, and miscellaneous office supplies for these persons.

4.8.11 OPTION: Network Engineer

The CONTRACTOR shall provide a network engineer, capable of managing, configuring, and programming the systems, equipment and software purchased under this contract. The network engineer shall be responsible for managing other personnel assigned to Milford and shall interface with Milford's personnel.

4.8.12 Training

The CONTRACTOR shall be responsible for training necessary personnel to perform duties assigned.

4.8.13 Equipment

The CONTRACTOR shall provide work vehicles for personnel equipped with tools and equipment necessary to perform duties assigned.

5 General System Requirements

5.1 Scope

The requirements of this section apply to all systems, equipment and software specified in this RFP.

5.2 Deviations from the Specifications

Systems, equipment, and software shall be based upon the latest technology and communications industry standards. The specifications in this RFP are meant to define a level of functionality without being overly restrictive. Deviations from the specifications *may* be allowed *if* they (1) will improve operational capability, maintainability, or technical quality; or (2) diminish the propensity toward obsolescence.

5.3 Brand Names

The use of brand names in this specification is intended to establish minimum performance standards and is not intended to be restrictive. The PROPOSER may propose alternate but equal equipment. Proposals using alternate but equal equipment shall be accompanied by point-by-point specification comparisons demonstrating that the proposed equipment indeed equals or exceeds the specified equipment in all areas germane to the operational requirements of the RFP.

Any specification requirements that cannot be readily verified based on provided equipment data sheets, may be treated as exceptions during the evaluation.

5.4 System Reliability

5.4.1 Single-Point Failures

Failure of a single device or component (a single-point failure) within the communications system shall not reduce the ability of the system to provide the required communications under routine operational conditions.

5.4.2 Multi-Point Failures

Simultaneous failure of multiple devices or components within the system (a multi-point failure) may reduce the ability of the system to provide communications under routine operational conditions, but the system shall be designed to degrade gracefully, providing at least minimal communications under these conditions.

5.5 General Equipment Specifications

5.5.1 New Equipment

Equipment shall be the latest version of new, standard equipment. Except as noted elsewhere in the RFP, used or refurbished equipment will not be accepted.

5.5.2 Environmental Specifications

All fixed equipment must meet the following environmental specifications:

Condition	Specifications	
	Indoors	Outdoors
Operational Temperature	+5° to +40° C	-30° to +60° C
Operational Relative Humidity	10 to 90% Non-condensing	0 to 100% Condensing

5.5.3 Equipment Power Requirements

All sites involved in the system have or will have available 120/240 VAC, three-wire, single-phase or 120/208 VAC four-wire, three-phase, 60 Hz electric service. All fixed equipment power supplies, rectifiers or battery chargers must be compatible with the electric service available.

5.5.4 Equipment Grounding

The CONTRACTOR shall ground its equipment to the site ground system in accordance with ANSI J-STD-607-B.

5.5.5 Surge Protection

The CONTRACTOR shall furnish and install surge protective devices (SPDs) on all electrical, communications and control circuits connected to its equipment in accordance with ANSI J-STD-607-B. Where SPDs are or will be provided by others, the CONTRACTOR shall verify the suitability of these SPDs for its equipment. If these SPDs are suitable, the CONTRACTOR is not required to install additional SPDs.

5.5.6 FCC Part 15 Devices

All electrical and electronic equipment must comply with the standards for unintentional and incidental radiators found in 47 CFR 15, "Radio Frequency Devices."

5.5.7 Proprietary Equipment

The system shall be based as much as possible upon commercial off-the-shelf (COTS) servers, workstations, routers and switches, and associated operating system software. Milford desires the ability to replace this equipment with commercially available equipment, in the event of an emergency.

Specifications for the identified equipment and software must be provided with the system maintenance documentation.

5.6 Software and Hardware Versions

Versions of software and hardware must be the latest publicly released versions or revisions at completion of system installation.

5.7 Computer and Network Security

Multi-layered security solutions shall be implemented to minimize the risk that a security incident will reduce the ability of the system to provide the required communications under routine operational conditions.

5.7.1 Computer Security

Computers integrated into the system must be configured and equipped to minimize risk to the reliability and availability of the system. The following requirements establish a minimum level of security based upon industry standards. These requirements include configuration, software, and documentation requirements.

5.7.1.1 Anti-Virus Software

All computers running a standard operating system shall be protected with anti-virus software. The equipment should be compatible with Milford's preferred anti-virus software.

5.7.1.2 Operating System Configuration

All computers running a standard operating system shall be protected with host-based intrusion prevention software (HIPS). The HIPS shall be tuned to protect system applications with minimal interaction with the end user. It shall be kept patched and up to date for the duration of the Warranty and any subsequent extended warranty periods.

5.7.2 Network Security

5.7.2.1 Authentication

All network elements (servers, workstations, routers, switches, etc.) that allow access through the network must support username and password authentication. Elements shall support, at a minimum, ten-character complex passwords. Passwords shall expire, at most, every 90 days.

5.7.2.2 Ports and Protocols

The CONTRACTOR shall supply port and protocol information for all devices connecting to the radio system network at the Detailed Design Review (DDR). The information must be of sufficient detail to support the creation of default deny filtering in network and security equipment. The CONTRACTOR shall support troubleshooting and resolution of issues associated with the supplied information.

5.7.2.3 DMZ Support

The CONTRACTOR shall certify any application that resides on a network outside of the communications system network and interfaces with devices in the communications system network will operate correctly through a De-Militarized Zone (DMZ). A DMZ is defined as firewall and intrusion preventive functions in default deny configuration that protects the interface between the radio system network and outside networks.

5.8 Installation

Equipment and physical facilities must be installed in a neat and professional manner, employing the highest standard of workmanship and in compliance with applicable standards.

All sites must be left in a neat, presentable condition throughout the installation phase of the project. All rubbish, temporary structures, and equipment generated or used by the CONTRACTOR must be removed after completion of the work, and prior to acceptance.

5.8.1 Calibration of Test Equipment

All measuring and test equipment used for installation and/or acceptance testing must be part of a documented calibration program. Calibration must be traceable to the National Institute of Standards and Technology (NIST). The following equipment must be included in the calibration program:

- oscilloscopes
- service monitors
- spectrum analyzers
- network analyzers
- frequency counters
- signal generators
- multimeters used for quantitative measurements
- wattmeters
- time-domain reflectometers
- RF return-loss bridges
- torque wrenches used where torque wrenches are required

The following equipment does not need to be included in the calibration program:

- multimeters used for checking continuity
- rulers
- tape measures
- bubble levels

5.8.2 Racks and Cabinets

Except for small ancillary equipment (such as dehydrators, coaxial surge suppressors, modems or punch blocks) and computer equipment for human interface to the radio system (such as consoles and network management system workstations), all fixed communications equipment must be mounted in cabinets or racks.

Cabinets must be suitable for the environment in which they are installed (e.g., NEMA Type 3R or 4X for outdoor installations exposed to rain, sleet, and snow). Shelters or equipment rooms must have appropriate environmental controls (HVAC) for the installed equipment and the environment in which they are installed. Cabinets must be equipped with locking doors or panels.

Racks must meet the requirements of current revision EIA-310.

Racks and cabinets shall be designed and installed to provide easy access to equipment controls and connection points.

5.8.3 Rack and Cabinet Installation

All equipment racks and cabinets must be securely mounted to the floor. If necessary, racks or cabinets must be bolted together or braced from the ceiling to prevent swaying or being dislodged. Racks must be isolated from floors and ceilings using suitable insulators, insulating plates, washers, and sleeves.

Equipment racks and cabinets must be placed to allow a minimum of 30 inches access front and back, unless all connection and maintenance points are in the front. Under no conditions shall an equipment rack or cabinet need to be moved for maintenance after installation.

5.8.4 Electromagnetic Exposure

All sites must be designed, protected, and posted to meet the limits for both public and occupational human exposure to radio frequency (RF) electromagnetic fields in accordance with FCC rules and FCC OET Bulletin 65.

Where required by 47 Code of Federal Regulation (CFR) 1.1307(b), the CONTRACTOR shall provide to Milford a statement of compliance with the electromagnetic exposure limits found in 47 CFR 1.1310 for each licensed radio system site within 10 days prior to acceptance testing at a site.

5.8.5 Labeling

All cables and wiring between equipment must be clearly labeled at both ends indicating source and destination equipment, connector designation and termination points.

5.9 Contractor Commitment

The CONTRACTOR shall maintain and upgrade the operational software and hardware to its most recent revision level for the term of the contract. There shall be no requirement on Milford's part to incorporate any new features. The Contractor shall provide equipment software and hardware patch, upgrade or release notes.

Any change shall have minimal impact on system operations, or the cost shall be assumed by the CONTRACTOR.

6 Radio System Requirements

6.1 New System Description

6.1.1 P25 Conventional Radio System

The Town of Milford is planning to upgrade to a new VHF P25 conventional radio system that meets Project 25 standards. To supplement radio coverage the CONTRACTOR shall install Digital Vehicular Repeaters (DVR's) in public safety vehicles. Dispatch consoles shall be installed at the new dispatch center that will be built at the Milford Police Station as described in Section 6.7 below. Each proposal shall provide radio coverage analysis, traffic loading analysis, and meet all requirements described in these specifications.

6.1.2 Radio Sites

A list of existing radio sites is provided in Table 9-1 in section 9 Physical Facilities. The PROPOSER may choose from other sites not listed in Table 9-1 for inclusion in the system design based on the following criteria:

- Radio coverage
- Connectivity network availability
- Facility availability
- Licensing and permitting
- Physical access
- Availability of primary electric power
- Cost

6.1.3 Frequency Plan and Traffic Loading Analysis

The CONTRACTOR shall develop and recommend a frequency plan for the radio system based upon a traffic loading analysis and identify the most appropriate frequencies for its system design. Milford requires:

- Busy Hour Impact – Must measure the busiest hour in a year to use mobiles, portables, control stations and consoles
- Delayed Call Grade of Service Limits < 1%
- Maximum Acceptable Call Delay < 1 second

The CONTRACTOR shall use the initial number of radios (mobiles, portables, control stations and consoles) for all Departments and Agencies from Milford listed in Table 6-1 below and project the future growth for 15 years after Final System Acceptance. Milford has estimated 1.5% growth per year; so, the CONTRACTOR shall multiply the initial number of radios by 1.5% to obtain the number of radios for traffic loading analysis.

Agency	Portables	Mobiles	Control / Desktop Stations	Consoles
Milford Police	30	18	1	
Milford Fire	58	25	1	
Milford Ambulance	10	10	1	
Milford Public Works	6	23	2	
Milford Dispatch Center			4	4

**Table 6-1 List of subscribers by agency and Dispatch Center Consoles
 (including back-up control stations)**

The CONTRACTOR must use historical traffic data or industry standard data in their traffic loading analysis – number of messages per unit per hour (Busy Hour Impact), and the length of each message, usually separated by Law Enforcement, Fire Fighters, Medical Services, Utilities, Public Works, Emergency Communications, etc.

6.2 Features and Functions

6.2.1 System Identification Codes

The system shall utilize digital system ID codes to prevent interference between systems of like protocol. The PROPOSER shall guarantee that it will not assign the same unique system ID to any system other than Milford’s for the life of their system.

6.2.2 Unit Identifiers

The system shall support at least 64,000 non-fixed consoles and subscriber units, each with a separate discrete numeric identifier (ID). When a unit transmits, its ID shall be displayed at properly equipped consoles and subscriber units.

6.2.3 Emergency Access

Emergency access shall be by means of an emergency button on the unit. Depressing the emergency button shall have two results:

- Preemptive emergency notification to a continuously manned dispatch position within 0.5 second will be ensured.
- The channel of the user pressing the emergency button shall be assigned the highest priority and shall be brought up for use within the same 0.5 seconds even if there is traffic on all the working channels. All users on that channel shall be automatically notified that there is an emergency in progress.

6.2.4 Denial of Access

The system shall deny access to selected units under the control of the system manager. When a unit is denied access to the system, that unit shall not be able to transmit to the system on any channel and it shall not be allowed to receive any operational voice or data traffic from the system on any channel. The unit shall monitor the radio channels to allow reactivation by the system manager.

6.2.5 Unit Disable

The system shall remotely disable compromised units under the control of the system manager. When a unit is disabled, that unit shall not be able to operate until reprogrammed. Once disabled, the unit shall not monitor the radio channels to allow reactivation by the system manager.

6.2.6 Over-the-Air Programming (OTAP)

The radio system shall be equipped with over-the-air-programming so that subscriber unit operational parameters may be modified securely without removing a unit from service and returning it to a central location.

6.2.7 Encryption

6.2.7.1 Encryption Algorithms and Keys

The system and designated subscriber units shall be equipped with multiple key AES encryption.

6.2.7.2 End-to-End Encryption

The system shall provide end-to-end encryption, i.e., there shall be no point between sending unit and receiving unit, whether subscriber unit or console, where a message is decrypted and transported in the clear. All equipment shall be capable of being manually rekeyed by interfacing with a portable key fill device (KFD).

6.2.7.3 OPTION: Over-the-Air Rekeying

The system shall support over-the-air rekeying (OTAR) of encrypted subscriber units.

6.2.7.3.1 OPTION: Key Management Facility

OTAR shall be accomplished and encryption keys shall be maintained by a key management facility (KMF). The KMF shall be capable of managing the rekeying subscriber units in groups and/or individually. The KMF shall incorporate means of tracking the rekeying process, identifying which units are rekeyed and which have not been rekeyed.

The KMF shall incorporate security partitioning to allow multiple agencies to utilize the same KMF without compromising security across operational groups.

The KMF shall support and shall be capable of managing manual rekeying via a KFD.

The KMF shall have a means to clear all keys in a compromised subscriber unit.

6.2.7.4 OPTION: KMF Workstations

The following quantity of KMF workstations shall be installed at this location:

Location	Workstations
Milford Police Department/Dispatch Center	2

Table 6-2 KMF Workstation Locations

6.2.8 Option: ISSI

Milford may add Inter-RF Subsystem Interface (ISSI) to facilitate connection with regional jurisdictions.

6.2.9 Station Identification

The system shall use an automatic means to conform to FCC requirements regarding station identification.

6.2.10 Interoperability Channels

Milford Interoperability Channels shall be required with the consoles as listed below in Table 6-3.

Channel Name	Existing / New	Frequency Band	System Type	Analog / Digital	Conventional / Trunked
Mont Vernon Police	Existing	VHF	Standalone Repeater Sites	Analog	Conventional
Mont Vernon Fire	Existing	VHF - Low Band	Standalone Repeater Sites	Analog	Conventional
Wilton Police	Existing	VHF	Standalone Repeater Sites	Analog	Conventional
Wilton Fire	Existing	VHF	Standalone Repeater Sites	Analog	Conventional
Wilton Ambulance	Existing	VHF	Standalone Repeater Sites	Analog	Conventional
Lyneborough Police	Existing	VHF	Standalone Repeater Sites	Analog	Conventional
Nashua Police	Existing	700/800 MHz	P25	Digital	Trunked
Nashua Fire	Existing	700/800 MHz	P25	Digital	Trunked
Brookline Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
Brookline Ambulance	Existing	VHF	Legacy Non-P25	Analog	Conventional
Amherst Fire/Rescue	Existing	VHF	Legacy Non-P25	Analog	Conventional
Med1/Med2	Existing	VHF	Legacy Non-P25	Analog	Conventional
Peterborough/KMA	Existing	VHF	Legacy Non-P25	Analog	Conventional
Bedford Fire	Existing	VHF	P25	Digital	Trunked
GRN/Mason Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
Townsend Fire	Existing	UHF	Legacy Non-P25	Analog	Conventional
Hollis Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
AMR	Existing	VHF	Legacy Non-P25	Analog	Conventional
Goffstown Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
Medevac Helicopter	Existing	VHF	Legacy Non-P25	Analog	Conventional
Merrimack Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
Manchester Fire	Existing	VHF	Legacy Non-P25	Analog	Conventional
Catholic Medical Center	Existing	VHF	Legacy Non-P25	Analog	Conventional
Elliot Hospital	Existing	VHF/UHF	Legacy Non-P25	Analog	Conventional
Monadock Community Hospital	Existing	VHF	Legacy Non-P25	Analog	Conventional
Southern NH Medical Center	Existing	VHF	Legacy Non-P25	Analog	Conventional
St. Joseph Hospital	Existing	UHF	Legacy Non-P25	Analog	Conventional

Table 6-3 Milford Required Interoperability Channels

6.3 Performance

6.3.1 System Access Time

System access time is the time from the radio user’s pressing the push-to-talk button to the radio unit’s transmission on a working channel (assuming working channels are available). The system access time shall be instantaneous for a P25 conventional system.

6.3.2 System Throughput Delay

System throughput delay is the time from the transmission of an audio signal into a transmitting digital radio microphone to reception of the identical audio signal from a receiving digital radio speaker. The system throughput delay shall be less than the following:

- 250 ms for direct radio-to-radio communications
- 350 ms for direct radio-to-radio communications through a single repeater station
- 500 ms for direct radio-to-radio communications within an RF subsystem
- 1250 ms for direct radio-to-radio communications through two or more RF subsystems

6.3.3 Interference

6.3.3.1 Self-Interference

The radio system shall not cause self-interference. At each radio site, the static sensitivity of each radio system receiver shall be degraded by no more than 3 dB with any combination of radio system transmitters in operation.

6.3.3.2 Interference to Collocated Equipment

The radio system shall not cause interference to incumbent collocated RF equipment within 1000 ft of the new radio system equipment.

6.3.4 Radio System Reliability

6.3.4.1 System Failure Modes

All possible system failure modes shall be defined in the system's operational capabilities and limitations:

- GPS timing system failure
- Master oscillator failure
- Voter/comparator failure
- Interconnection circuit failure
- Transmitter failure
- Receiver multicoupler failure
- P25 system core failure
- Simulcast controller failure

The Proposer shall describe typical and maximum fault detection and failover times associated with redundant equipment. System acceptance testing shall demonstrate that each of these failures results in system recovery within the maximum failover 30 seconds.

6.3.4.2 Simulcast System Failures

The simulcast system must maintain reliability in the event of system failure and must operate in a bypass mode of operation. In the event of a multi-point failure of wide-area or simulcast capabilities, the radio system shall revert to single site operation, where the individual site continues to function as a standalone radio site with specific channels enabled/disabled to prevent interference.

6.3.5 Radio System Coverage

6.3.5.1 Service Areas

The radio system shall provide portable and mobile coverage in the service area (Milford Town Limits) shown in Figure 6-1.

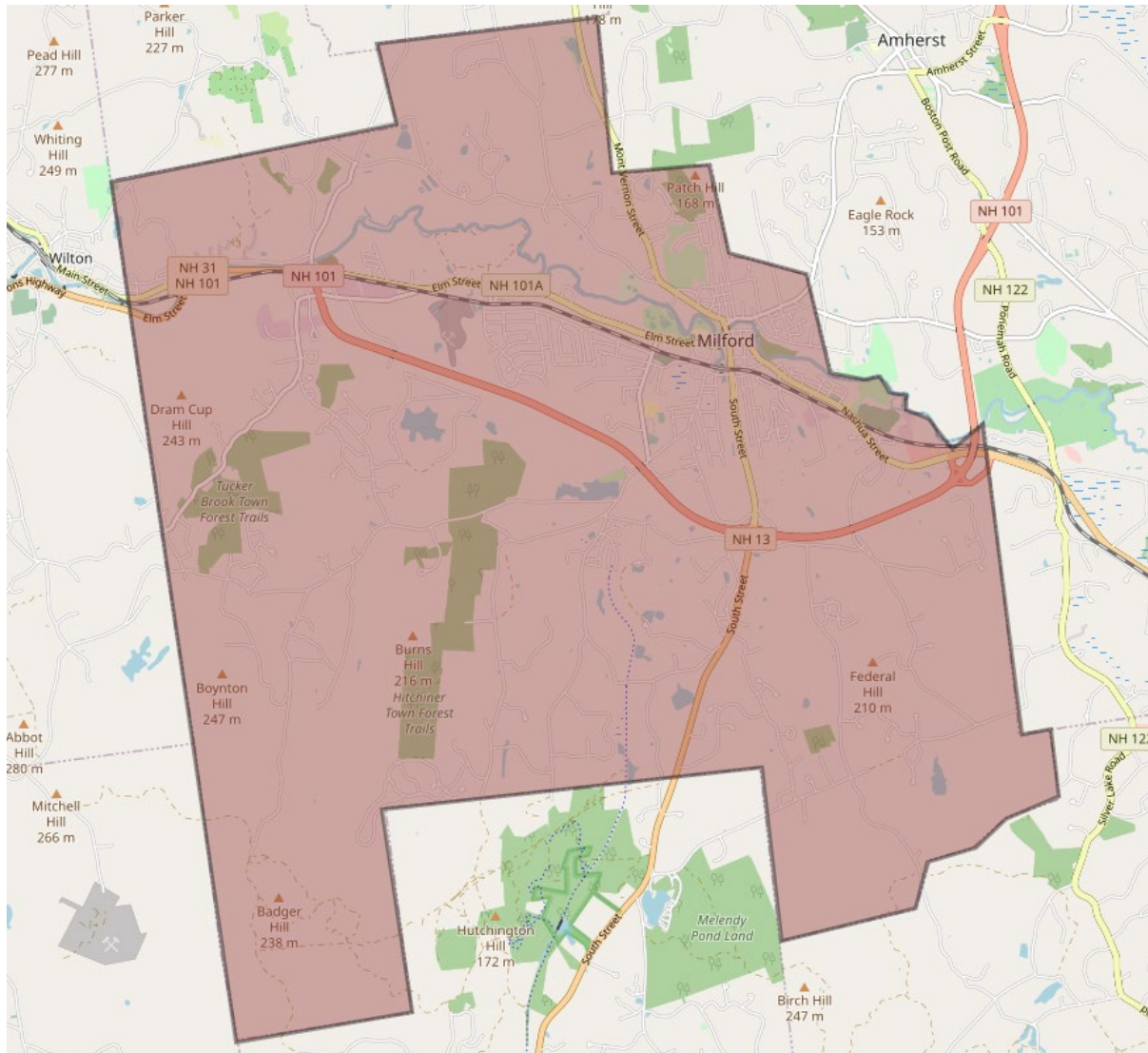


Figure 6-1 Service Areas

6.3.5.2 Required Coverage Level

The radio system shall provide a minimum delivered audio quality (DAQ) of 3.4 to the receiver in both the talk-out (base to mobile) and talk-in (mobile to base) directions. DAQ is defined in Telecommunications Industry Association (TIA) Telecommunications Systems Bulletin TSB-88.1-D, *Wireless Communications Systems – Performance in Noise and Interference-Limited Situations – Recommended Methods for Technology-Independent Modeling, Simulation, and Verifications*.

For test sectors requiring portable radio coverage, talk-in and talk-out coverage shall be based on the portable radio mounted at waist level.

6.3.5.3 Service Area Reliability

The radio system shall provide the specified service area reliability (as defined in TSB-88.1-D) to each of the service areas and radio transmission direction (talk-out and talk-in) as follows in Table 6-4:

Service Area	Conditions	Talk-Out	Talk-In
		Service Area Reliability	
Mobile	Mobile radio in vehicle with Roof-mounted antenna (Town-wide)	95%	95%
Portable	Portable radio outdoors worn on the hip with a speaker mic (Town-wide)	90%	90%

Table 6-4 Service Area Reliability Requirements

Each service area reliability percentage shall guarantee the coverage level requirement. There is no time availability aspect to this specification. The PROPOSER is independent and may choose its propagation model, terrain database, statistical prediction method, and coverage charts.

Provide separate coverage maps for each service area and direction (talk-out and talk-in) to support your guarantees, include your propagation model(s), identify radio models, site locations (longitude, latitude, elevation, Tx and Rx antennae AGL), and detailed parameters.

Provide information only coverage maps for portable radios inside light buildings (12 dB additional building loss) and medium buildings (20 dB additional building loss).

6.3.5.4 Critical Building Coverage

Coverage shall be provided to and from portable radios inside the Town of Milford designated critical buildings utilizing a vehicle equipped DVR parked outside the building. The vehicle will be parked near the main entrance of the building. Once the vehicle is parked, it may not be moved to improve coverage.

A standard portable radio shall be used to test the system access and voice quality within the building. Each floor of the build shall be tested in 6 locations determined by the test team but must include a test on each emergency stairwell platform, for each floor, and the elevator lobby for each floor. Table 6-5 below is a list of the Town of Milford designated critical buildings.

Please provide a list of critical buildings for the table below.

Building Name	Building Address	Construction Type	No. of Floors
All Schools			

Table 6-5 Critical Buildings

6.4 Radio System Equipment

Equipment shall be of the highest quality, most durable public-safety-grade equipment available. Equipment shall meet or exceed current standards of the Electronic Industries Alliance (EIA) and the Telecommunications Industry Association, and the rules and regulations of the Federal Communications Commission (FCC), in addition to these specifications.

The absence of detailed specifications implies that the best general practice will prevail, and that high-quality material and workmanship will be applied.

6.4.1 Base Station

Base stations shall meet or exceed the performance requirements of a Class A transceiver as defined in the following standards:

- ANSI/TIA-603-D, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards; and
- ANSI/TIA-102.CAAB-C, Project 25 Land Mobile Radio Transceiver Recommendations, *C4FM/CQPSK Modulation*.

6.4.2 OPTION: Voting Comparator

Voting comparators shall vote both voice and data transmissions. Digital voting comparators shall select the best received signal based on bit error rate (BER). The digital voter shall be capable of selecting the best signal on a frame-by-frame basis.

6.4.3 Antenna Systems

The following minimum specifications, for each fixed antenna system proposed, shall be provided:

- Antenna mounting height and location on tower
- Antenna type and gain
- Transmission line type and loss
- Combining and multi-coupling network

6.4.3.1 Transmission Lines and Antenna System Accessories

Transmission lines shall be one continuous length with a copper conductor and weatherproof jacket. All RF connectors shall be installed in accordance with their manufacturer installation requirements.

All RF connectors shall be weathertight gold- or silver-plated contacts. All connectors shall be torqued to the manufacturer's specifications using a torque wrench. All connectors shall be soldered, not crimped. Manufacturer-approved wrapping and sealer shall be utilized on all outdoor transmission line in-line and grounding connections to prevent water intrusion. Outdoor installations shall include the proper minimum diameter drip loops in all cabling. Transmission lines shall be securely fastened to a cable tray or ladder attached to the tower using manufacturer approved devices and methods. Mounting hardware, cable hangers, grounding kits and other miscellaneous items shall be supplied to ensure proper installation of the antenna and transmission line. All metal components shall be intrinsically corrosion resistant. A hoisting grip shall be used at the top and at manufacturer recommended intervals to provide strain relief.

6.4.3.2 Transmit Combiners

Combiner insertion loss shall not vary from specifications by more than 0.5 dB on any port.

6.4.3.3 Receiver Multi-couplers

Each unused multi-coupler port shall be terminated with a 50-ohm load.

6.5 Simulcast Requirements

If a simulcast system is proposed it shall meet the specifications of this section. The following simulcast system details shall be provided:

- System timing
- Launch delay
- Frequency stability
- Frequency deviation
- Simulcast alignment

6.5.1 Simulcast Design

A simulcast system shall be designed so that, once aligned, it shall remain aligned and shall not need routine realignment.

Under no conditions of failure shall the system be allowed to operate with two co-channel transmitters transmitting simultaneously unless that operation is in the intended simulcast by-pass mode.

Parameters for simulcast alignment shall be determined by the CONTRACTOR to meet coverage requirements.

6.5.2 Transmitter Frequency Stability

The system shall be designed such that the radio frequency difference between any pair of co-channel transmitters operating in the simulcast mode shall not exceed 1.0 Hz.

6.5.3 Automated Simulcast System Timing

Automated simulcast system timing shall be referenced to GPS. Automated timing system shall allow for initial simulcast launch timing (bulk delay and offset) settings for each transmitter site. The system shall automatically readjust timing to maintain proper simulcast timing in the event a path reroute changes the transport delay from the simulcast prime/control site to a remote simulcast site.

6.5.4 Simulcast System Alignment

Simulcast system alignment procedures shall be straightforward and logical. After the system is initially aligned and accepted, there shall be procedures and alignment test facilities in place to allow routine verification of system alignment and equalization. There shall further be procedures, alignment equipment and facilities in place to allow realignment and re-equalization of the system under extraordinary situations such as replacement or repair of system components.

Routine verification of system alignment shall be possible using a single maintenance technician, preferably at a single location. Realignment may require more than one maintenance technician at more than one location.

6.6 VHF Paging System

The Town of Milford operates a two site VHF non-simulcast analog tone paging system. The system uses two VHF channels; 155.100 MHz is transmitted from the MACC Base Rooftop tower (Milford Ambulance); and 154.370 MHz is transmitted from the Federal Hill tower (Milford Fire). Paging tones are currently sent from paging encoders located at the Milford Area Communications Center (MACC Base) dispatch positions.

The CONTRACTOR shall provide new VHF paging infrastructure equipment and P25 pagers. This provision shall include tone paging encoders (if necessary), tone paging capabilities for the control stations at the Milford Ambulance and Fire stations, and backup Dispatch control stations. Milford Fire and Ambulance shall be tone paged on their primary dispatch channels simultaneously with the dispatch on their portable and mobile radios.

Please provide coverage maps with your proposal for the new VHF tone paging system design for review by the Town of Milford.

6.7 Console System

6.7.1 Dispatch Console System Configuration

The Milford Area Communication Center (MACC Base) currently dispatches all public safety agencies for the Town of Milford. The town of Milford is in the process of designing and implementing their own Public Safety Answering Point (PSAP) that will serve as the Milford Dispatch Center for all Milford public safety agencies. The Milford Dispatch Center will be a new addition to the existing Milford Police Station located at 19 Garden Street, Milford NH 03055.

The Town of Milford requires four (4) dispatch console positions located in the new Milford Dispatch Center. There will be one (1) supervisor position, two (2) Police/Fire/EMS Dispatcher positions, and one (1) spare/training position that will be used for backup and training purposes.

The new dispatch consoles will interface with the conventional channels described in Table 6-3 Interoperability Channels. The console system will also interface with the new logging recorder described in this RFP.

6.7.2 Features and Functions

6.7.2.1 P25 Conventional Radio System

The console system shall interface with the new P25 conventional radio system and shall provide all console control features over the radio system. The console system shall support both P25 Phase 1 conventional or trunked and P25 Phase 2 trunked.

The console system shall provide full P25 open-standard encryption/decryption capabilities (AES) that are compatible with P25 subscriber units. The encryption/decryption functionality shall be under the control of authorized users through the radio console system. The console system shall support encrypted voice calls.

The consoles shall support emergency call operation and have both a visual and an audible notification of emergency calls initiated by the subscriber units.

6.7.2.2 Interoperability Radio Channels

The new console system must interface with existing interoperability channels and provide the same level of operation as the existing console system described in Table 6-3 above. The interoperability channels must be capable of being patched to the new P25 conventional radio system channels.

6.7.2.2.1 Tone Remote Control

The console system shall be equipped with tone remote control capability. The system shall be compatible with industry-standard tone remote control protocols.

6.7.2.2.2 E&M Signaling

The console system shall be capable of Ear & Mouth (E&M) signaling to control any conventional radios, if necessary.

6.7.2.2.3 System Guard Tone

A system guard tone shall be available for the conventional radios.

All modules shall be capable of generating EIA tone sets, which may be required for special purposes.

In compliance with FCC regulations, if control circuit facilities should be lost, the system shall be designed such that the base station transmitter ceases transmitting within 500 milliseconds.

6.7.2.3 Backup Control Stations

Each console position shall be equipped with one full-featured backup control station. The control station may be located at the console position, or a remote controller may be located at the console position with the control station in a separate equipment room.

6.7.2.4 Instant Recall Recorder

Each console shall be equipped with an instant recall recorder (IRR). The IRR shall be capable of recording radio communications from the selected channel or talk group. If telephone communications are performed through the console headset, the IRR shall be capable of recording audio from telephone communications. The IRR shall be capable of storing at least 30 minutes of audio. IRR audio shall be replayed through the console select speaker.

The IRR shall be equipped with the following features:

- Fast forward and reverse
- Simultaneous record and playback

6.7.2.5 Paging Encoder

The console system shall be equipped with integrated paging encoder capabilities and support the two-tone sequential paging format. The encoder shall be capable of initiating a single page or multiple pages at once. The console operator shall be able to review paging sequences before transmission is initiated. Paging sequences shall be queued while other paging sequences are being transmitted. An indication shall be provided at the console to indicate when a paging sequence is complete.

6.7.2.6 CAD System Interface

The console system shall be equipped with hardware and software interfaces to the Milford IMC computer-aided dispatch (CAD) systems to enable the CAD systems to display unit ID and status (and any other available information) from the radio system.

6.7.2.7 OPTION: Auxiliary Inputs and Outputs

The console system shall be equipped with auxiliary inputs and dry contact relay outputs (Aux I/Os) for doorbell, door controls and remote alarms. Auxiliary inputs shall be visible at each console. Auxiliary outputs shall be operable at each console position. The system shall be equipped with at least eight inputs and eight outputs.

6.7.2.8 Concurrent Console Operation

Allowances shall be made for parallel console operation with the existing radio system and the new radio system until complete conversion to the new radio system.

6.7.3 Console Equipment

6.7.3.1 Physical Configuration

Console equipment shall be installed in the new dispatch center at the Milford Police Station.

The individual consoles shall be modern workstations with central processing unit (CPU) and audio cabinets, as necessary. Console monitors shall use flat-panel technology. Workstation CPUs shall be housed in the console furniture to maximize operator work surface.

6.7.3.2 Operator Position Hardware

The CONTRACTOR shall provide the following equipment:

- | | |
|----------------|---|
| Footswitch: | One single pedal footswitch per console |
| Microphone: | One per console, high-quality microphone preferably on a pedestal. |
| Headset Jacks: | Two headset jacks per console, below table edge mountable, automatically disconnect external microphone and select speaker, the capability to converse on the telephone using the same operator headset and jack that is used for radio conversations shall be provided. Separate volume controls shall be provided to control radio volume and telephone volume to the headsets. |
| Speakers: | One select speaker and one unselect speaker per console, with volume controls. |

6.7.3.3 Workstation

The workstation shall be mounted below the work surface, but controls shall be accessible to the console operator with minimal effort.

The workstation shall use a mouse or similar pointing device. The operator can transmit using either the left or the right mouse button.

The workstation shall also have a standard PC keyboard.

6.7.3.4 Flat-panel Display

The display shall be a 24-in flat-panel LCD display. Minimum resolution shall be 1280 x 960 pixels. Display controls shall be accessible to the console operator.

The monitors shall be touch screen capable.

6.7.3.5 Select and Unselect Speakers

Speaker audio output shall be at least 3.5 W. Each speaker shall have its own volume control. The select speaker shall reproduce the audio from the selected talk groups or channels. The unselect speaker shall reproduce the audio from the other talk groups or channels being monitored by the console.

6.7.3.6 Foot Switch

The footswitch shall permit the console operator to key the selected talk group or channel. On conventional channels, the footswitch may be programmed to disable coded squelch.

6.7.3.7 Dual Headset Jacks

Each position shall be equipped with two headset jacks. Jacks shall be standard four- or six-wire connections for headsets with integrated microphones. Inserting the headset plug into either jack shall route the select audio to the headset and disable the console select speaker.

Headset jacks shall interface with the existing telephone system so that dispatchers can use the same headset for telephone and radio communications.

6.7.4 Console System Operation

The console system shall provide the following features and capabilities:

6.7.4.1 Console Operating Characteristics

The consoles shall be designed to enhance the operator's capabilities in performing resource management tasks and minimize the effort and concentration required for radio control. Transmitting over the displayed selected talk groups or conventional channel(s), and instant transmitting over a displayed talk group or conventional channel shall be performed with only one operator action.

To minimize operator confusion and mistakes, all channels, talk groups, and users shall be indicated by actual aliases, not numeric resource references. Cross-referencing a number to a talk group or conventional channel name shall not be required when performing a dispatching operation. For maximum flexibility, these aliases shall be defined by the Purchaser at system installation and shall be easily changed at any time after system installation. Aliases coding shall allow at least 8 alphanumeric characters.

6.7.4.2 Display Areas

Display screens shall be configured to minimize distractions to operators while providing access to all radio dispatch functions from a single screen. The screen shall display:

- System Status
- Radio Controls
- Call History
- Date and Time

6.7.4.3 Active Status Indicator

For each radio resource shown in the radio controls portion of the console screen, the following indications shall be available:

- Permanent indications
 - Resource Alias
 - Volume
 - Mute Status
- On-demand indications
 - Call Status
 - Select
 - Patch
 - Simultaneous Select
 - Busy
 - Multi-Frequency Transmitter
 - Squelch Disable

- Emergency Call indication and alarms

6.7.4.4 Console Capabilities

The console shall be capable of the following operations:

- Supervisory Control: Allows supervisor to override or disable a console position.
- Patch: Allows multiple talk groups or channels to be patched together. The console shall be capable of at least three patches simultaneously.
- Simultaneous Select: Allows console operator to call multiple talk groups or channels at once. The console shall be capable of at least three simultaneous select groups.
- Intercom: Allows console operator to selectively talk to another console directly.
- Console Cross Mute: Prevents feedback between consoles.
- Alert Tones: The console shall be capable of transmitting alert tones over the radio system.
- Console Pre-Empt: The console shall have priority or console pre-emption transmit capabilities on the conventional radio system.

6.7.4.5 Time Synchronization

All consoles shall be synchronized to the radio system common time signal reference.

6.7.5 OPTION: Remote Dispatch Consoles

Remote dispatch operations shall be supported by the Console System to allow Milford to operate console positions at locations removed from the dispatch center. It is accessible to the network by direct connection to the network or via other means, such as satellite connectivity. This shall be a fully functional console for radio dispatch. Aux I/O is not required to be supported.

It is envisioned that this application could operate on an existing PC or laptop. It would use the microphone and audio/speaker connectors of the PC.

6.8 Logging Recorder

The CONTRACTOR shall provide a new logging recorder to interface with the new P25 conventional radio system. The recorder shall function as a full featured logging recorder with the capability of recording all radio channels, encrypted and clear, on the radio system, conventional interoperability channels, and all Milford Dispatch Center's administrative and 9-1-1 telephone lines. The recorder shall capture full call data for each such as date and time, caller unit ID and alias, radio channel or individual ID and alias, emergency, and encrypted status. Calls shall be retrievable later by searching date and time, radio channel and/or unit ID.

The new recorder shall also record 9-1-1 call-handling equipment (control stations and future consoles) at the dispatch center's backup facility at the Milford Fire Department and shall be upgradeable to full IP interfacing to the 911 call-handling system, if or when the dispatch center transitions from legacy 9-1-1 circuits to an ESINet.

The logging recorder shall provide redundant equipment such that there are no single points of failure.

6.9 Network Management System

6.9.1 General

Network management consists of the following functions:

- configuration management
- performance management

- security management
- fault / alarm management

The network management system (NMS) may comprise one or more subsystems to perform these functions. For example, configuration, performance, and security may be provided on one NMS network, while alarm reporting may be provided on a separate NMS. The NMS shall be a GUI-based, multi-protocol network management tool. The NMS shall provide remote access via VPN with SSL web access control security. The NMS shall be capable of e-mail and paging notifications of threshold events that require immediate response and deployment.

NMS access shall be available at the following locations:

- Milford Police Station (function shall be available on at least two workstations in this location)
- Milford Dispatch Center
- Remote VPN

6.9.2 Configuration Management

The NMS shall provide the human-machine interface for configuration of the radio system and associated subsystems. Radio system configuration includes items such as the following:

- channel partitions
- encrypted channel designations
- enabling or disabling channels
- enabling or disabling sites
- system fault definitions
- paging codes
- console configurations or personalities

Subscriber or user configuration includes items such as the following:

- allowable call length
- talk group definitions
- unit IDs
- enabling or disabling subscriber units

The NMS shall provide a database for all radio system elements. The NMS shall allow the system administrator to perform multiple simultaneous database operations.

6.9.3 Performance Management

The NMS shall display and store system status and traffic data for functional and organizational management of the user base.

The NMS shall display system performance information on an NMS workstation with a summary printer. The system shall be capable of displaying channel activity for the entire system on screen.

The NMS shall store performance data on electronic media. Real-time storage capacity shall be sufficient to store system activity records for one full week.

Data displayed and stored shall include the following items as a minimum:

- System Traffic Data
 - Channels in use
 - Total channel minutes on the air
 - Transmitter use balance

- System busy time
- Emergency Priority utilization
- Usage Optimization

- System Status Data
 - System failures in progress
 - System organizational changes (unit reassignments)
 - Report Building
 - Activity Details
 - Activity Summaries
 - Alarm Control, Display, and Logging
 - Channel Statistics
 - Site Statistics
 - Event Logs
 - On Screen Reports

- Subscriber Traffic Data
 - Unit (including consoles) making call and the time the call was successfully completed
 - Length of transmission
 - Time in waiting queue
 - Type of call (e.g. group, individual, telephone, data, etc.)
 - Destination of call (e.g. group ID, individual ID, etc. that received call)

6.9.4 Security Management

Access to the NMS shall be password-protected. There shall be at least two levels of password access. Access to status, activity, alarms, and other system information shall be available to several authorized users. Control and diagnostic operations shall be accessible to a limited number of administrator-level users authorized to control these operations.

The servers shall have the ability to be remotely supported by via VPN. The database administrator shall have the capability to monitor all VPN access and activity while being performed by the remote entity.

Web browser access shall be provided with support monitoring and control functions and administratively restrictive database modifications. Multiple locations and users should be able to access the monitoring screens concurrently.

6.9.5 Fault/Alarm Management

The NMS shall monitor the radio system and microwave network for critical and non-critical failures and status changes. The system shall be continuously and automatically monitored for failure of any key component. Any failure of a key component shall be automatically indicated at the NMS workstations.

6.9.5.1 Alarm Points

The NMS shall monitor and alarm major and minor failures, abnormal conditions of operation, and status changes of the radio system and connectivity network. Alarms monitored shall include equipment failures or link failures of or to the following equipment or systems:

- GPS receivers
- Repeaters
- Antenna systems
- Control systems
- Network management systems

- Database management systems
- Consoles
- Summary alarms from connectivity network system
- Channel banks
- Loop switches
- Routers
- Network switches

The above list is a minimum requirement. The NMS shall allow any failure or abnormal operating condition to be traced to the equipment level.

In addition to radio system alarms, the following facility alarms at each communications location are to be integrated into the NMS:

- Building Intrusion
- Building Low/High Temperature
- Tower Lighting
- Building Smoke/Fire
- Fire Suppression System Discharge
- Air Conditioner Failure
- Commercial Power Failure
- Generator Run
- Generator Control Switch Not Set
- Generator Low Oil Pressure Pre-Alarm
- Generator Low Oil Pressure Alarm
- Generator Low/High Coolant Temperature Pre-Alarm
- Generator Low/High Coolant Temperature Alarm
- Generator Low Fuel in Tank
- Generator Failure Summary Alarm

6.9.5.2 Alarm Point Inputs

The alarm system shall accommodate the following types of status inputs, at a minimum:

- Form C relay (either N/O or N/C)
- TTL
- RS-232

Where available, SNMP is the preferred method for capturing and reporting alarms to the NMS.

Any additional third-party equipment that supports the overall communications system shall be provisioned with alarm ports that are compatible with the proposed alarm system.

6.9.5.3 Alarm Indication

When a major or minor failure or status change occurs, an indication shall be displayed on the alarm system terminal within 30 seconds of the alarm occurrence.

The alarm system terminal shall display a report for each alarm containing, at a minimum, the following information:

- Station name
- Point name
- Point status description
- Optional instruction line

Alarms shall remain active until the failure is corrected and the alarm is reset by the operator.

6.9.5.4 Redundancy

The NMS shall be fully redundant for both hardware and software, with a primary and a backup server. The geo-separated backup server shall be co-located with the backup radio system core, and must be updated with all alarm, provisioning, and measured data daily at a minimum, without interruption to the functionality of the NMS. In the event of equipment failure of the primary server, the backup server shall automatically switch in a seamless manner to the primary mode of operation. If the primary server loses visibility of any remote sites due to microwave equipment or hop outage, the backup server shall assume the primary function of operation for sites that have lost connectivity to the primary server but retains connectivity to the backup server.

6.9.5.5 Visible and Audible Annunciation

Each alarm indication shall provide a visible and audible annunciation when an alarm occurs. The audible alarm may be silenced when the alarm is acknowledged by the operator.

6.9.5.6 Historical Data

The alarm system shall store historical alarm data. Historical alarm reports shall be capable of querying, allowing the operator to produce alarm reports based on individual alarm, equipment, equipment type, subsystem, or time. Historical data shall be exportable to other software for analysis. The system shall store historical alarm data for a period of 90 days at a minimum.

7 Connectivity Network Requirements

7.1 Connectivity Network Requirements

The connectivity network shall provide IP digital connectivity among the conventional radio system sites and core network equipment at the Milford Dispatch Center. The capacity of the network links must be at least 155 Mb/s to support the radio system, other existing circuits and future applications of the Town of Milford. The telecommunications links shall be IP microwave provided by the CONTRACTOR.

The connectivity network shall be designed to meet the availability requirements specified in this RFP. True redundancy shall be provided for all LMR traffic and alarm system circuits, such that the failure of any single path or piece of equipment must not degrade radio system performance. Connectivity is only needed between the RF site and the Dispatch Center but should be able to be expanded into a regional system with a ring topology in the future.

7.2 Existing Connectivity Network

The Town of Milford currently has fiber connectivity from the Town Hall to the Police Department, Fire House, and Library. There is also fiber connectivity between the Police Department and the Ambulance facility.

Future fiber resources are expected to be between Town Hall to the SAU and the DWP.

7.3 Microwave System Requirements

7.3.1 Configuration

The microwave system shall provide redundant routing to/from each RF site to the core equipment location and to the dispatch centers. Failure of a single telecommunications circuit shall not diminish the ability of the connectivity network to provide required connectivity between the RF sites and the dispatch centers. The connectivity design shall have path and equipment redundancy. The system shall be scalable and capable of upgrading capacity by adding additional microwave RF channels via the proposed antenna system.

7.3.2 Microwave Frequency Bands

The microwave network shall use licensed frequencies in the 4.9, 6, 11, 18 and 22 GHz fixed service bands.

7.3.3 Microwave System Performance

7.3.3.1 Path Availability

Each microwave path shall be designed to provide a minimum two-way path (round-trip) availability of 99.999 percent at a BER threshold of 1E-7. Note that a one-way microwave path (outbound or inbound) requires the minimum availability of 99.9995 percent at a BER threshold of 1E-7.

Microwave path propagation predictions and designs shall be based on line-of-sight conditions conforming to the following obstruction clearance criteria:

- $0.6 F1 + 10$ feet at $K = 1.0$
- $0.3 F1$ at $K = 2/3$
- $F1$ at $K = 4/3$

7.3.3.2 Circuit Quality

The microwave system shall be designed to provide a minimum 1E-7 BER for each Digital Signal 1 (DS1) end-to-end circuit, including any combination of contiguous microwave hops.

7.4 Network Management System

The NMS shall provide a single platform for personnel to monitor the connectivity network and to provide adequate alarm information for first level response to system degradation and outages. The NMS shall be a GUI-based, multi-protocol network management tool. The NMS shall provide remote access via VPN with SSL web access control security. The NMS shall be capable of e-mail and paging notifications of threshold events that require immediate response and deployment.

Network management consists of the following functions:

- equipment provisioning
- configuration management
- performance management
- security management
- alarm management

The NMS shall provide summary alarm outputs to the radio system NMS.

7.4.1 Configuration Management

The NMS shall provide the interface for configuration of the connectivity network. Connectivity configuration includes items such as the following:

- Provisioning of the microwave radio equipment
- Administrative functions

The NMS shall provide a database for all network elements and configuration parameters. The NMS shall allow the system administrator to perform multiple simultaneous database operations.

7.4.2 Performance Management

The NMS shall display and store system status, alarm indications, administrative functions, and NMS system access. The NMS shall store performance data on electronic media. Real-time storage capacity shall be enough to store system activity records for one full month.

The NMS shall display system performance information on an NMS workstation.

Data displayed and stored shall include the following items at a minimum:

- System failures (static and intermittent)
- Historical Report
- Activity Details
- Activity Summaries
- Alarm Control, Display, and Logging
- Equipment Statistics
- Site Statistics
- Event Logs
- On-Screen Reports
- Receive signal level (RSL)
- IP packet statistics such as collisions, jabbers, packet sizing and fragments

Data stored and reported, and thresholds for upper and lower limits shall be customizable.

7.4.3 Security Management

Access to the NMS and other system elements shall be password-protected. There shall be at least two levels of password access. Access to status, activity, alarms, and other system information shall be available to three authorized users. Control and diagnostic operations shall be accessible to a limited number of administrator-level users, authorized to control these operations.

The servers shall have the ability to be remotely supported by via VPN. The database administrator shall have the capability to monitor all VPN access and activity while being performed by the remote entity.

Web browser access shall be provided with support monitoring and control functions and administratively restrictive database modifications. Multiple locations and users should be able to access the monitoring screens concurrently.

7.4.4 Fault Management

The NMS shall monitor the connectivity network for critical and non-critical failures and status changes. The system shall be continuously and automatically monitored for failure of any key component. Any failure of a key component shall be automatically indicated at the NMS workstations.

7.4.4.1 Self-Diagnostic Capabilities

The system shall have the following diagnostic capabilities to facilitate and enhance the troubleshooting ability of the NMS system and associated hardware.

- Monitor master and backup server hardware components (disk drives, fans, temperature)
- Gather statistics on quality of polling per address
- Gather statistics on quality of polling per polling port
- Ability to view polling activity in text as well as protocol (byte) level
- Internal operational alarms shall be monitored and appear as other system event alarms

7.4.4.2 Alarm Points

The NMS shall monitor and alarm major and minor failures, abnormal conditions of operation, and status changes of the radio system and connectivity network. Alarms monitored shall include equipment failures or link failures of or to the following equipment or systems:

- Network management systems
- Database management systems
- Microwave radios
- Network routers
- Network switches

The above list is a minimum requirement. The NMS shall allow any failure or abnormal operating condition to be traced to the shelf sub-system level.

The connectivity NMS shall provide summary alarm outputs connected to inputs of the radio system NMS.

7.4.4.3 Alarm Point Inputs

The alarm system shall accommodate the following types of status inputs, at a minimum:

- Ethernet (SNMP)
- Form C relay (either N/O or N/C)

- TTL
- RS-232

7.4.4.4 Alarm Indication

The NMS GUI screen display shall display the complete monitored network and associated programmed alarms, controls, and status. The GUI layer display progression shall be as follows:

- Global View: This shall be a mapped representation of all sites. If an alarm condition exists at a site, a single colored icon shall illuminate red for critical/major, yellow for minor, green for normal, and blue for manual control.
- Site Level View: The site level views shall illustrate the equipment at each individual site. Each equipment sub-system shall be represented by an illuminated colored icon.
- Equipment View: The equipment view shall expand the equipment subsystem in the Site Level View and display the individual racks, shelves and modules generating the alarm. Each displayed rack, shelf and module shall have a colored icon illuminated.

When a major or minor failure or status change occurs, an indication shall be displayed on the alarm system terminal within 30 seconds of the alarm occurrence.

When an alarm is generated, the icon shall blink the appropriate color and continue to do so until acknowledged. Once an alarm point is acknowledged, the icon shall cease to blink and maintain the color associated with the priority level until the alarm status is normal.

The alarm system terminal shall display a report for each alarm containing, at a minimum, the following information:

- Date and time (stamped by either the master or RTU)
- Station name
- Point name
- Point status description
- Optional instruction line

The user shall have the capability to customize the system's alarm display field's format as to which fields are to be displayed, in what order and in what colors.

Clear or normal alarms and/or conditions shall have the capability to be displayed in various colors independent of the coloration of the failed alarms.

The system workstations shall have the capability of displaying in text and GUI representation all current system monitored alarm status.

All event state changes that have not been acknowledged by the user shall be displayed in a separate list of event state changes.

7.4.4.5 Alarm Point Attributes

The primary alarm description text field shall provide a minimum of 40 characters for each alarm status.

A secondary alarm description field shall assign the change of state severity: Critical, Major, Minor & Status. The third field shall provide condition indicators for fail and clear, Door Open, Door Closed, etc.

The system shall be capable of classifying alarms into selectable groups such as Critical, Power Alarm Group, Generator, etc.

The NMS Master shall have independent control of whether specified alarms are displayed on the workstation screen or are directly recorded within the history file.

The system shall have the capability of assigning special resolution instructions per alarm point to provide operator direction.

The operators shall have the ability to notate comments on alarm points. These comments shall be time stamped and log the operator who created the entry.

7.4.4.6 Alarm Notification Media

The NMS shall provide remote access via VPN with SSL web access control security. The NMS shall provide automatic e-mail and paging notifications of threshold events that require immediate response and deployment, utilizing the Milford Dispatch Center's existing Internet connections and/or any new connections provisioned for purposes of contracted network monitoring services.

7.4.4.7 Alarm Analysis

The NMS shall have the capability to establish truth table and threshold routines for leveled response. For example: Site A reports "*Microwave PA output, Low*" (This alarm by itself would not constitute an after-hour's callout). However, coupled with a site B intermittent "*Microwave Signal Degrade*" and a site B "*BER Threshold Alarm*" the NMS routine script would report "*Site A Microwave Transmitter Alarm, Major, Immediate callout, John Doe.*"

7.4.4.8 Visible and Audible Annunciation

Each alarm indication shall provide a visible and audible annunciation when an alarm occurs. The audible alarm may be silenced when the alarm is acknowledged by the operator.

7.4.4.9 Historical Data

The alarm system shall store historical alarm data. Historical alarm reports shall be capable of querying, allowing the operator to produce alarm reports based on date and time, site or subsystem, alarm classification, equipment, or equipment type. Historical data shall be exportable to other software for analysis. The system shall store historical alarm data for a period of at least 30 days.

7.4.5 Redundancy

The NMS shall be fully redundant for both hardware and software, with a primary and a backup server. The backup server must be updated with all alarm, provisioning, and measured data daily at a minimum, without interruption to the functionality of the NMS. In the event of equipment failure of the primary server, the backup server shall automatically switch in a seamless manner to the primary mode of operation. If the primary server loses visibility of any remote sites due to microwave equipment or hop outage, the backup server shall assume the primary function of operation for sites that have lost connectivity to the primary server but retain connectivity to the backup server.

7.4.6 Protocols

The NMS platform shall have the ability to support concurrently polled protocols on multiple ports. It shall be capable of alarm mediation, such as receiving collected alarms from another monitoring platform or element manager using one or more of the following protocols: SNMPv1, SNMPv2, SNMPv2c, SNMPv3, MODBUS, and TL1. The NMS shall have a MoM SNMPv2c (minimum) port that will report all alarm information to a higher order MoM.

7.5 Software

The system shall support software modularity, which shall allow for selective functionality enhancements to be added or removed based on the specific requirements of Milford.

7.6 Equipment Requirements

The microwave system shall include all equipment required for a complete operational system. The equipment shall be complete, mounted, and wired in racks, ready for operation. Accessories shall include specialized test fixtures, test cords, and adapters. All equipment shall be completely tested and tests shall be documented.

The equipment shall be completely solid-state, employing the latest technology, and shall be convection-cooled. All necessary standby switching, alarm sensing, and control shall ensure fully automatic operation. Equipment shall have remote alarm/control capability for any equipment failure.

7.6.1 Digital Microwave Radio

RF terminal equipment shall meet the following requirements:

Primary Power Input:	-48 VDC
Maximum Residual BER:	1E-10
Capacity:	150 Mb/s

RF Terminals shall be all indoor units.

7.6.1.1 Redundancy

The microwave equipment shall utilize redundancy against failure. All packets shall be automatically protected using BER threshold sensing, IP QoS monitoring and packet switching. All packet loss failures shall be sensed and remotely indicated.

The microwave equipment shall have fault-sensing capability that will detect transmitter and receiver failures and bit error rate degradation.

The equipment shall provide alarm outputs to the alarm system. The equipment shall provide status indications for local observation.

7.6.1.2 Spur-Configured Microwave Equipment

Spur configured microwave equipment shall be fully protected with monitored hot-standby (MHSB) transmitters and receivers. The receiver outputs shall be switched in a "hitless" (fewer than 10 bit errors) manner. The MHSB transmitters shall be switched to provide proper termination and isolation to the standby transmitter. Either the primary or secondary transmitter may be active. Provisions shall be included for testing and alignment of the standby units without disturbing the active units.

7.6.2 Microwave Power Supplies

All proposed microwave equipment shall be powered from a nominal -48 VDC supply.

7.6.2.1 Battery Charger/Powerboard Equipment

Microwave and multiplex sites shall be equipped with 48 VDC, positive-ground redundant charger/powerboard units. Charger/powerboard unit's recharge time shall not exceed eight hours to charge a discharged battery plant to its specified capacity. The charger/powerboard supplied shall

operate so that it provides adequate current output to support the microwave equipment site load. The charger/powerboard shall be equipped with and wired for operation in an EIA standard rack and shall consist of the following components:

- N + 1 multiple charger units configured for load sharing and redundancy
- Circuit breaker panel equipped with individual distribution circuit breakers
- Ground bar
- Volt/ammeter panel
- System load disconnect panel
- High/low voltage disconnect panels

The charger/powerboard units shall have the capability to operate in a battery-eliminator configuration.

7.6.2.2 Battery Plant Equipment

The battery system shall consist of sealed maintenance-free cells and shall meet or exceed eight (8) hours of operating time for supplied microwave equipment. Battery operating life expectancy shall be at least eight years.

Battery racks shall be installed, assembled, and wired as a complete operational system. Vendor-recommended corrosion-resistant hardware shall be provided to facilitate long-life operation of battery plants. Steel racks used to support battery units shall be protected by an acid-resistant material or coating. System shall be designed for easy access in the event batteries must be replaced.

7.6.3 Microwave Antenna Systems

The antennas, radomes, waveguide, and associated mounting hardware shall be rated to withstand winds and icing conditions common to Milford's service area.

Antennas shall be of solid construction with pressurized feed horns. Antennas may be single polarized or dual polarized. Antennas shall be furnished with long life radomes.

7.6.3.1 Microwave Antenna Mounting

All antennas 6 ft. or greater in diameter shall be secured to the tower with a minimum of two side-braces. Standard 4.5-inch diameter pipe mountings shall be utilized to support the microwave antennas.

Ice bridges or ice shields shall be installed above microwave antennas.

7.6.3.2 Microwave Transmission Lines

Premium copper elliptical waveguide shall be employed in continuous lengths for all transmission line runs. Splicing is not permitted. The waveguide shall be installed and grounded in accordance with the manufacturer's recommendations, using hardware approved by the manufacturer for that purpose.

7.6.4 Dehydrator/Pressurization System

The pressurization equipment shall maintain at least 5 psig of positive pressure in the elliptical waveguide and antenna feed horn. The CONTRACTOR shall include all required fittings, regulators and pressurization lines, gauges, distribution manifolds, and installation hardware. Separate pressure metering shall be provided for each waveguide pressurized. Alarm outputs for low pressure, high pressure, high humidity, and excessive run time shall be provided and connected to the network monitoring and control system.

All installed antenna/transmission lines shall be purged, pressure-tested, and tested for low VSWR using return loss measurements over the specified frequency band.

7.6.5 Optical Transport Network Equipment

Dedicated fiber optic links and/or leased lines may be used as components in the connectivity network.

7.6.5.1 Fiber Optic Cable

Fiber optic cable shall be constructed and installed in accordance with applicable TIA/EIA standards and the manufacturer's recommendations.

The system design shall use redundant cables be routed utilizing separate conduits to facilitate communications redundancy between each node. Redundancy configurations should support ring protection and secondary routing capabilities to protect against operational failures along routes.

A cross-connect (x-con) junction rack will be provided to house the splice tray equipment and x-con panels. The rack shall be a standard EIA/TIA-310 relay rack with standard hole spacing and will include the following:

- Fiber management panel to facilitate x-con cable routing
- Universal cable clamp for cable support
- Fiber identification flip chart

7.6.5.2 Transport Node Equipment

Transport node equipment shall be configured to support loop, or single path with 1+1 or N+1 redundancy switching architectures.

Transport node equipment shall adhere to the base rate and format along with multiplexing scheme specified in the ANSI T1.105-1991 standards and the optical specifications, transmission capabilities, and interface as detailed in ANSI T1.106-1988. Optional units shall be provided for 1310 nm and 1550 nm.

In a loop configuration, the transport node equipment shall be fully redundant at the optical network line side and the DS3/DS1 electrical drop side. The network loop will provide a primary (clockwise) DS1 link with a dedicated secondary (counterclockwise) DS1 link for all sites on the loop. The receive section on the line or network side will monitor the OC3, STS-1, DS3 or DS1 signals from both directions and perform a comparative selection according to BER or loss of signal (LOS), then switch to the non-degraded path. The switch function BER threshold at the OC3 level shall be 1E-6. If there is a failure in the primary link or equipment, the traffic will switch to the secondary route. The optical node equipment will transmit the DS1 circuits in both directions to allow for receiver-side switching only. The electrical drop side of the transport node equipment shall perform error-free manual and automatic switching functions of all circuits.

The transport node equipment shall fully protect traffic, overhead orderwire, digital service channels and wayside circuits in the event of equipment failure, fiber cut or single link failure.

The transport node equipment shall have fault-sensing circuitry that will detect optical and electrical transmitter, receiver, and sub-rate card failures and BER degradation. The equipment shall provide serial, contact and Simple Network Management Protocol (SNMP) alarm interfaces for reporting to the network management alarm system via a remote terminal unit (RTU). All available alarm points in the equipment and all external control inputs, which may be utilized for remote equipment control functions, shall be described.

Transport node equipment shall meet the following requirements:

- Primary power input of ± 24 or ± 48 VDC
- Link residual BER of less than $1E-10$

7.6.5.3 Digital Multiplexer Equipment

The digital multiplex equipment shall provide modulation and processing for the DS1 signals between the channel banks/routers and the fiber equipment.

The equipment shall be complete, mounted and wired in racks, ready for operation. Accessories shall include specialized test fixtures, test cords, and adapters. All equipment shall be completely factory-tested and documented in the final configuration.

The equipment shall be completely solid-state, employing the latest technology, and shall be convection-cooled. All necessary standby switching, alarm sensing, and controls shall ensure fully automatic operation, and it shall have remote alarm/control capability for any equipment failure.

Test points and facilities shall enable alignment and testing of all signal levels, including DS1 signals to and from the carrier equipment, levels, clock frequency, BER levels, framing, power supplies, and all interface signals, all with no interruption of service. Built-in alarms shall be provided for major, minor, power failure, BER, and loss of clock or framing.

In addition, a system-wide redundant master oscillator incorporating synchronization signals routed to all 1.544 Mb/s clocks shall be provided to ensure absolute phase coherence of the land mobile simulcast transmitter sites.

Optional clocking should be provided as follows:

- Receive side recovered clocking.
- Transmit master clocking.
- External clocking: GPS, Stratum and Telco reference.

They shall have local and remote provisioning access, be capable of performing loop back functions and testing, and have full diagnostic capabilities.

8 Subscriber Equipment

8.1 Definitions

Subscriber unit: a mobile, portable or control station radio

Accessory: a device that interfaces with a subscriber unit such as an external microphone, antenna, control head or battery charger.

8.2 Tiers

Subscriber units shall be provided in four tiers:

- high tier
- mid-tier
- basic tier
- agency-tier

High-, mid- and basic-tier radios shall be the same family of radios with the only differences being equipped features or options, and price. Typically, a high-tier radio includes a full keyboard, a mid-tier radio includes a limited keyboard, and a basic-tier radio does not include a keyboard. Accessories for these three tiers (such as microphones, antennas, batteries, and other features or options) shall be interchangeable. Agency-tier units are expected to be less-expensive, not necessarily in the same family above, with limited features and options this model.

Subscriber units shall be equipped with the features and functions specified in Table 8-1. All subscribers shall be capable of operation in the VHF band (136-174 MHz).

Feature	Configuration								
	Mobile			Portable			Control Station/Desktop Remote		
	High	Mid	Basic	High	Mid	Basic	High	Mid	Basic
Trunked Talk Groups or Conventional Channels	512	256	128	512	256	128	512	256	128
Time-Out Timer	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dynamic Regroup Capable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Out-of-Range Signal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group Call Capable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Emergency Call Button	Yes	Yes	Yes	Yes	Yes	Yes			
Talk-around Operation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Private Call Receive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Private Call Initiate	Yes	Option		Yes	Option		Yes	Option	
Vehicular Charger				Yes	Yes	Yes			
Keyboard	Yes	Limited		Yes	Limited		Yes	Limited	
Priority Group Scan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Call Receive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
All Call Initiate	Yes			Yes			Yes		
Encryption Capable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
On/Off Switch	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Volume Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Eight-Character Alphanumeric Display	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Transmit Indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System Busy Indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low Battery Indicator				Yes	Yes	Yes			
Over-the-air Rekey (OTAR)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Over-the-air Program (OTAP)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
GPS Location Services	Yes	Yes	Yes	Yes	Yes	Yes			
PTT Cellular Application	Yes	Option		Yes	Option		Yes	Option	
Call Alert	Yes	Option		Yes	Option		Yes	Option	
Radio/Data Interface Port	Yes	Yes	Yes						
Selective Radio Inhibit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wi-Fi Radio	Yes	Option	Option	Yes	Option	Option	Yes	Option	Option
LTE Radio	Yes	Option	Option	Yes	Option	Option	Yes	Option	Option
Bluetooth	Yes	Option	Option	Yes	Option	Option			

Table 8-1 Subscriber Unit Features

8.3 Standards

Subscriber units shall meet or exceed the performance requirements of a Class A transceiver as defined in the following standards:

- ANSI/TIA-603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards; and
- TIA-102.CAAB-C, Project 25 Land Mobile Radio Transceiver Recommendations, C4FM / CQPSK / WCQPSK Modulation.

8.4 Environmental Specifications

Subscriber equipment shall meet or exceed the environmental specifications listed in Table 8-2.

**Table 8-2
 Environmental Specifications for Subscriber Equipment**

Standard	MIL-STD 810C Method/Procedure	MIL-STD 810D Method/Procedure	MIL-STD 810E Method/Procedure	MIL-STD 810F Method/Procedure	MIL-STD 810G Method/Procedure
Low Pressure	500.1 / I	500.2 / II	500.3 / II	500.4 / II	500.5 / II
High Temperature	501.1 / I, II	501.2 / I, II	501.3 / I, II	501.4 / I Hot, II Hot	501.5 / I A1, II A2
Low Temperature	502.1 / I	502.2 / I, II	502.3 / II	502.4 / I C3, II C1	502.5 / I C3, II C1
Temperature Shock	503.1 / I	503.2 / I	503.3 / I	503.4 / I	503.5 / I C
Solar Radiation	505.1 / II	505.2 / I	505.3 / II	505.4 / I	505.5 / I A1
Rain	506.1 / I, II	506.2 / I, II	506.3 / I, II	506.4 / I, III	506.5 / I, III
Humidity	507.1 / I	507.2 / II	507.3 / II	507.4	507.5 / II Aggravated
Salt Fog	509.1 / I	509.2 / I	509.3 / I	509.4	509.5
Dust	510.1 / I	510.2 / I	510.3 / II	510.4 / I	510.5 / I
Immersion (for portables)	512.1	512.2	512.3	512.4 / I	512.5
Vibration	514.2 / VIII Cat. F, Curve W	514.3 / I Cat. 1, 10, 11, Cat. 3	514.4 / I Cat. 1, 10	514.5 / I Cat. 24	514.6 / I Cta. 24
Shock	516.2 / I, II	516.3 / I, IV	516.4 / I, II	516.5 / I, IV	516.6 / I, IV, V, VI

Specification	
Temperature (Operating)	-30 to +60° C
Temperature (Storage)	-40 to +85° C
Altitude	15,000 ft
Altitude (Transit)	50,000 ft
Humidity	95% @ 50° C
Shock	1 m
Vibration	5 G
Immersion	IEC 60529 IP87

Table 8-2 Environmental Specifications for Subscriber Equipment

8.5 Project 25 Compliance

Subscriber units shall be fully compliant with the latest mandatory versions of the Project 25 Phase 1 (12.5-kHz FDMA) and shall be fully interoperable with all TIA-102-compliant trunked and conventional radio systems.

Any offered subscribers shall be provided the Supplier's Declarations of Compliance (SDoCs) and Summary Test Reports in accordance with the Project 25 Compliance Assessment Program. Identify any features or functions of the proposed subscribers that do not comply with the TIA-102 standards. Also identify any proprietary features or functions of the proposed subscribers that are not defined in the TIA-102 standards.

8.6 Over-the-Air Programming (OTAP)

Subscriber equipment shall be capable of over-the-air programming (OTAP) so that subscriber unit "personality" may be modified remotely without removing a unit from service and returning it to a central location.

8.7 OPTION: Multiband

Subscriber equipment shall be capable of operating multiband radios for VHF, UHF and 700/800 MHz bands and shall be equipped with appropriate antennas, features, and accessories. The Town of Milford may select dual-band operation for some or all their subscribers.

8.8 OPTION: GPS Location Services

Subscriber equipment shall be equipped with GPS receivers and appropriate software to support P25 Phase 2 Location Services to provide location data to the fixed network for display on a subscriber mapping system (location service host system).

8.9 OPTION: PTT Cellular Application

The PROPOSER shall offer a PTT over cellular smartphone application that will allow users to talk on the radio system from a smartphone device. The application shall be capable of operation on 3G/4G LTE cellular data networks. The application may be capable of operation on Wi-Fi connections as well.

8.10 OPTION: Wi-Fi/LTE Radio Module

Subscriber equipment shall be capable of communicating over Wi-Fi networks and/or LTE networks. The ability for the same radio to operate on both Wi-Fi and LTE networks can be proposed but is not required.

8.11 OPTION: Bluetooth

Subscriber equipment shall be equipped with Bluetooth.

8.12 OPTION: Encryption

Selected subscriber units shall be equipped with P25-compliant multiple key AES encryption.

8.12.1 OPTION: Key Fill Device

The encryption key fill device (KFD) shall interface with subscriber units and shall provide the user the ability to load, erase and read key information.

8.12.2 OPTION: Over-the-Air-Rekeying

Subscriber units shall be capable of P25-compliant over-the-air rekeying (OTAR).

8.13 Re-use of Existing Subscribers

The Milford Police Department has some Motorola APX subscribers that are P25 capable. If it is the desire of the PROPOSER, these subscriber units can be re-used for the proposed P25 radio system. If your proposal includes re-use of these subscriber units, please describe all upgrades / reprogramming required and the cost for these radios to operate on your proposed P25 radio system. The table below describes the model number and quantities of P25 subscriber radios currently owned by the Milford Police Department.

Model	Quantity
Motorola APX 8000	1
Motorola APX 7000	15
Motorola APX 6000Li	5

8.14 Mobile Radio Equipment

Mobile radios shall include the following components and accessories:

- transceiver
- control head
- palm microphone and mounting hook
- speaker
- cabling
- antenna
- mounting hardware

The mounting hardware shall securely fasten the housing to the vehicle.

8.14.1 Trunk-Mounted Mobile Radio Units

Trunk-mounted radios shall come equipped with a key lock to lock the radio into the housing.

The trunk-mounted radio shall be available in a dual-control-head unit option.

8.14.2 Dash-Mounted Mobile Radio Units

The dash-mounted radio shall have the controls mounted on the front panel or surface of the radio. No separate control head shall be required for proper operation of the radio. The radio's speaker shall be an integral part of the radio package. For configurations requiring a front-panel keypad, the speaker may be at a remote location from the unit.

8.14.3 Mobile Radio Antennas

The mobile radio antenna shall consist of a stainless-steel antenna element, antenna mount and low-loss antenna cable. The mobile radio antenna shall be available in two styles: standard and disguised. Each shall be supplied with a minimum of 15 ft of antenna cable and shall meet or exceed the following specifications:

Frequency Range	136-174 MHz
Maximum VSWR	1.5:1 (dual-band or multiband VSWR < 2.0:1)
Minimum Gain	3 dB over a quarter-wave monopole (or unity)
Power Capability	50 W (dual-band or multiband: 100 W)

8.14.3.1 Standard Mobile Radio Antennas

Standard mobile radio antenna radiating element shall be removable and replaceable without disturbing the antenna mount. The antenna mount shall be suitable for mounting on a vehicle roof, trunk, light bar, or other similar locations.

8.14.3.2 OPTION: Disguised Mobile Radio Antenna

The disguised mobile antenna shall be similar in design and appearance to cellular mobile antennas. The disguised antenna shall provide "no-hole" mounting.

8.14.3.3 Mobile Antenna Installation

The CONTRACTOR shall observe current Town of Milford antenna mounting practices and recommend antenna mounting locations.

8.15 Portable Radio Equipment

The portable radio unit shall be small and of such a form factor that normal operation can be accomplished with one hand. The portable radio shall be supplied with antenna, and two Li-ion polymer rechargeable batteries. The batteries shall maintain a minimum capacity of 80% rated after one year of service. Each portable radio shall be provided with a leather holster or belt loop swivel clip and a single-unit charger.

All portable radios for Fire/Rescue and Bomb Squad personnel shall be certified by Factory Mutual that their operation is intrinsically safe for Classes I, II and III; Division 1; Groups C, D, E, F and G; and non-incentive for Class I, Division 2, Groups A, B, C and D.

The housing of the portable radio shall be of high impact-resistant material. The Li-ion battery supplied shall provide at least 8 hours of operation on a 5% transmit, 5% receive and 90% monitor duty cycle and shall be a positive lock, and quick disconnect type. The battery housing shall be constructed of a material as durable as the portable radio housing and shall match the color and footprint of the portable radio. The antenna provided with the unit shall be covered with soft plastic or rubber and be provided with a blunt safety tip.

8.15.1 Portable Battery Chargers

AC single- and multi-battery chargers shall be available to charge the portable radio batteries. Chargers shall be capable of charging batteries while either attached or not attached to the portable radio.

Chargers shall be capable of charging a mix of models of batteries. Chargers shall be suitable for either desk- or wall-mounting and shall be capable of recharging batteries to a full charge in eight hours or less. Illuminated LEDs shall be provided to indicate whether the unit is charging or is fully charged. Charging current shall be regulated and over-charging shall be electronically monitored, controlled, and prevented.

Multi-battery chargers shall be capable of recharging a minimum of five batteries at any one time.

8.15.2 OPTION: Vehicular Charger

The vehicular charger package shall accept the portable radio and automatically provide the proper charging current from the vehicle's electrical system. The charger package shall be suitable for mounting in the under the dashboard or other suitable locations in passenger vehicles, pick-up trucks, vans, and other types of vehicles such as fire engines.

The portable radio shall be held firmly in the vehicular charger. An illuminated LED shall indicate that the unit is charging. An illuminated LED shall also indicate that the unit is fully charged. Charging current shall be regulated and overcharging shall be electronically monitored, controlled, and prevented.

8.15.3 OPTION: Speaker-microphone

Speaker microphones shall meet the same environmental and intrinsically safe requirements as the portable radio.

8.16 Digital Vehicular Repeater

The Digital Vehicular Repeater (DVR) shall achieve a high level of portable coverage outdoors and inside buildings on scene. The DVR shall operate transparently to the user and shall not be required to “turn on”, change channels, or make any other undertakings to utilize the DVR. The portable will remain in DVR mode at all times, unless the portable is not at a location with a vehicle equipped with a DVR.

The DVR shall operate end-to-end encryption from the portable to the radio system and from the radio system to the portable without decrypting transmissions between the transmitter and receiver.

8.16.1 System Operation

The DVR shall offer three modes of operation:

8.16.1.1 Mobile Operation

The DVR can be disabled, and the mobile radio will operate normally (as if the DVR is removed).

8.16.1.2 Local Repeat

The DVR can be enabled to retransmit signals to and from portables. Signals from the radio system received by the mobile radio shall be heard in the mobile speaker and retransmitted by the DVR on a programmable basis.

When the mobile push-to-talk button is pressed, only the DVR is enabled, allowing the mobile operator to communicate with units on scene. The mobile operator has full priority over the DVR. The operator must enter either the “mobile” or “DVR” mode to transmit to the system over the mobile radio. This mode will be used for on-scene operations where the radio traffic does not need to repeat to dispatch, such as fireground operations or during special events.

8.16.1.3 System Repeat

The mobile radio and the DVR are both enabled. Signals received by the DVR will be heard on the mobile speaker, delivered to the mobile radio, and retransmit the mobile to the radio system. Signals from the radio system received by the mobile radio will be heard in the mobile speaker and retransmit the DVR to all associated portables on that channel.

When the mobile radio push-to-talk button is pressed, both the mobile and the DVR will transmit mobile audio.

8.16.2 Functions

The DVR shall incorporate the following functions:

8.16.2.1 Multiple DVR's

When more than one DVR is located on scene, only one DVR shall have priority and enable to transmit and receive while all others stand by. This operation should happen autonomously and shall not require vehicle operators to enable or disable their DVR when multiple DVR's equipped on scene.

If the priority DVR leaves the scene, there shall be an autonomous process that automatically enables one of the standby DVR's to become the priority repeater while all others continue to operate in standby mode.

8.16.2.2 Portable Priority

The DVR shall be programmable to allow priority to portables operating on the DVR. If, while retransmitting a signal from the radio system, the DVR detects a portable transmission, it will cease transmitting the system signal and begin retransmitting the portable signal.

8.16.2.3 Transmit Time-Out

The DVR shall have a programmable time-out timer. The timer shall not reset until the receiver squelch is reset.

8.17 Control Station

The control station shall be provided in a small, attractive cabinet. The PROPOSER is to determine the type of cabinet most suitable for the installation of each control station. The cabinet may be designed for desktop, floor or wall mounting. The station shall be powered from a 120-VAC, 60-Hz single-phase source. The station shall be operated either locally or remotely under control of the console equipment or a remote-control unit. All control stations provided shall be capable of functioning in either the trunked or conventional mode.

The control station may also be used as a limited system backup component in the event of a loss of connectivity between the RF Site(s) and the Dispatch.

A desktop remote control unit shall be available for operation with the control station. The remote-control unit shall interface with and provide all the features and functions of the control station. The remote-control unit shall provide the capability to control a minimum of five talk groups.

The remote-control unit shall be housed in an attractive housing suitable for operation in an office or administrative area. The unit shall include a built-in speaker, volume control, and desk style microphone.

The unit shall be furnished with control line and power line surge protectors. The unit shall provide control functions compatible with the control station.

The control station antenna system shall comprise a directional antenna, transmission line, connectors, and miscellaneous hardware. The control station antenna shall meet or exceed the following requirements:

- Frequency Range: 136-174 MHz
- Maximum VSWR: 1.5:1 (dual-band or multiband: VSWR < 2.0:1)
- Power Capacity: 50 W (dual-band or multiband: 100W)

9 Physical Facilities Requirements

9.1 General Requirements

Communications facilities shall be of proven design to withstand severe weather including lightning, wind, flooding, ice and snow accumulation, wildfires, and earthquakes.

Facilities shall protect the communications system from the public and shall protect the public from potentially hazardous parts or emissions of the communications system.

Facilities shall be designed and installed in accordance with applicable current codes, ordinances and regulations imposed by authorities having jurisdiction; these current standards; and the communications equipment manufacturer's design and installation current revision standards. Where there is a conflict between requirements, the more stringent requirement shall apply.

9.2 References

9.2.1 Normative References

The following documents, either in whole or in part, are referenced in this physical facilities specification:

American Association of State and Highway Transportation Officials (AASHTO)

- AASHTO HB, Standard Specifications for Highway Bridges

American Concrete Institute (ACI)

- ACI 301-05, Specifications for Structural Concrete
- ACI 302.1R-04, Guide for Concrete Floor and Slab Construction
- ACI 318-08, Building Code Requirements for Structural Concrete and Commentary

American National Standards Institute (ANSI)

- ANSI J-STD-607-A-2002, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.

American Society for Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE)

- ASHRAE Handbook—Fundamentals

American Society of Safety Engineers

- ANSI/ASSE Z359, Fall Protection Code

ASTM International

- ASTM A 615-08a, Standard Specifications for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- ASTM C 31-08a, Practice for Making and Curing Concrete Test Specimens in the Field
- ASTM C 33-01a, Standard Specifications for Concrete Aggregates
- ASTM C 39-05e1, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- ASTM C150-00, Standard Specification for Portland Cement
- ASTM D 420-98, Standard Guide to Site Characterization for Engineering Design and Construction Purposes
- ASTM D1556-07, Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method

- ASTM D 1557-07, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000-ft-lbf/ft³ (2,700 kN-m/m³))
- ASTM D 2487-06e1, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- ASTM D 6938-08a, Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- ASTM G 57-06, Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner *Four-Electrode Method*

Electronics Industry Alliance (EIA)

- EIA/ECA-310-E, Cabinets, Racks, Panels and Associated Equipment

Federal Aviation Administration (FAA)

- Advisory Circular 70/7460-1K, Obstruction Marking and Lighting
- Advisory Circular 150/5245-43F, Specification for Obstruction Lighting Equipment

Federal Communications Commission (FCC)

- Code of Federal Regulations, Title 47, Telecommunications (47 CFR)
- Office of Engineering and Technology (OET) Bulletin 65, *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE Std. 81-1983, IEEE Guide for Measuring Earth Resistivity, Ground Impedance and Earth Surface Potentials of a Ground System
- ANSI/IEEE Std. 81.2-1991, IEEE Guide to Measurement of Impedance and Safety Characteristics of *Large, Extended or Interconnected Grounding Systems*

National Electrical Contractors Association (NECA)

- NECA 1, Standard Practices for Good Workmanship in Electrical Contracting

National Fire Protection Association (NFPA)

- NFPA 70, National Electrical Code
- NFPA 72, National Fire Alarm Code
- NFPA 101, Life Safety Code
- NFPA 110, Standard for Emergency and Standby Power Systems
- NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Power Systems
- NFPA 780, Standard for the Installation of Lightning Protection Systems
- NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems

Telecommunications Industry Association (TIA)

- TIA-222, Structural Standard for Antenna Supporting Structures

Underwriters Laboratories (UL)

- UL 467, Grounding and Bonding Equipment
- UL 752, Standard for Bullet-Resisting Equipment
- UL 1449, Standard for Surge-Protective Devices
- UL 1778, Uninterruptible Power Systems

9.2.2 Informative References

The following references provide additional useful information but are not referenced in this document:

Alliance for Telecommunications Industry Solutions (ATIS)

- ATIS 0600311, DC Power Systems – Telecommunications Environment Protection
- ATIS 0600313, Electrical Protection for Telecommunications Central Offices and Similar Type Facilities
- ATIS 0600316, Electrical Protection of Telecommunications Outside Plant
- ATIS 0600318, Electrical Protection Applied to Telecommunications Network Plant at Entrances to Customer Structures or Buildings
- ATIS 0600330, Valve-Regulated Lead-Acid Batteries Used in the Telecommunications Environment
- ATIS 0600334, Electrical Protection of Communications Towers and Associated Structures

American Society of Civil Engineers (ASCE)

- ASCE 7, Minimum Design Loads for Buildings and Other Structures

Illuminating Engineering Society (IESNA)

- IESNA HB, Lighting Handbook Reference & Application

Institute of Electrical and Electronics Engineers (IEEE)

- IEEE C2, National Electrical Safety Code (NESC)
- IEEE Std. 142, Grounding of Industrial and Commercial Power Systems

International Code Council

- International Building Code

Telecommunications Industry Association (TIA)

- TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises
- TIA-568-C.1, Commercial Building Telecommunications Cabling Standard
- TIA-568-B.2, Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components
- TIA-568-C.3, Optical Fiber Cabling Components Standard
- TIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces

9.3 Sites

9.3.1 General

A typical, dedicated communications site layout is shown in Figure 9-1. The actual layout for each site will vary depending upon the:

- Size and shape of the lot
- Size and type of tower and building
- Number of current and future site tenants
- Existence and location of site utilities
- Federal, State and Local codes, ordinances and regulations

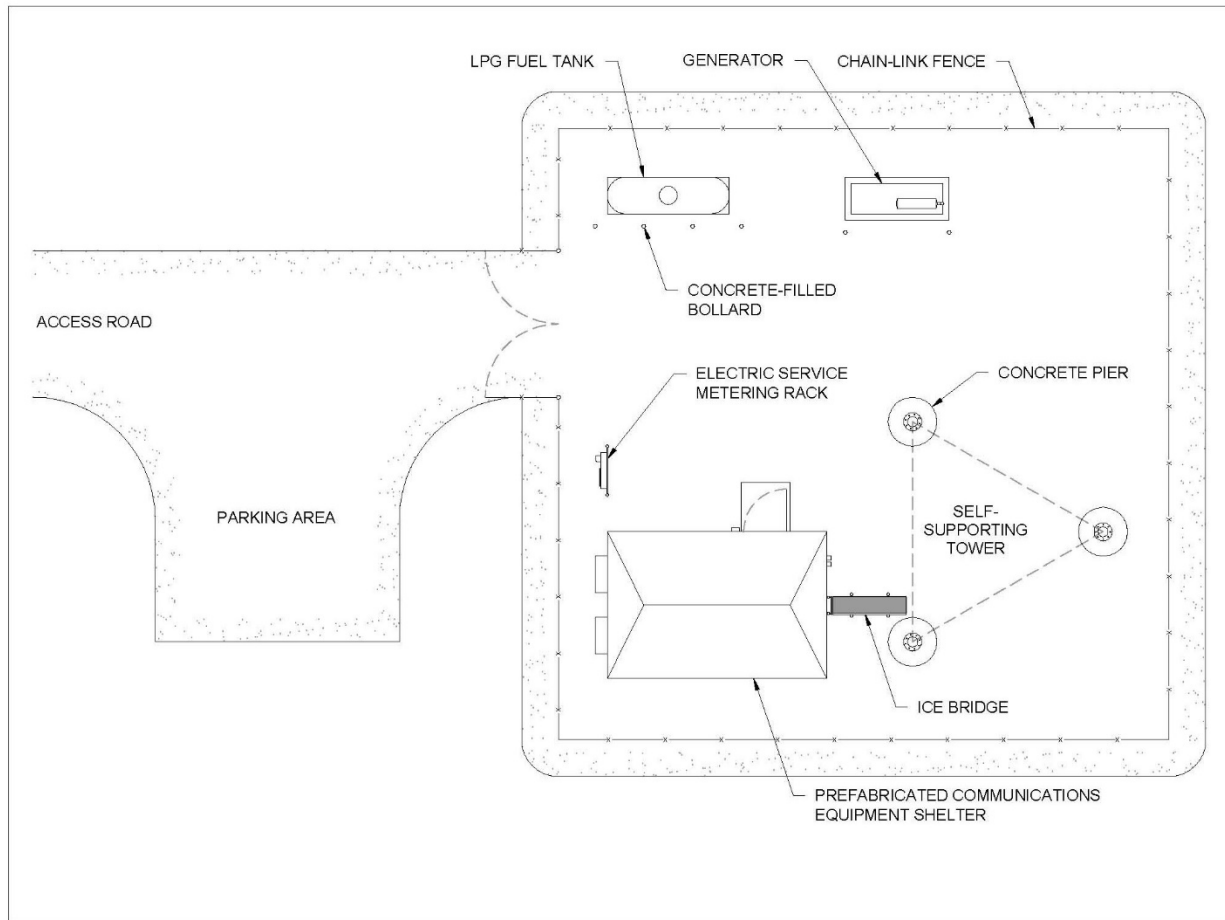


Figure 9-1 Typical Communications Site Layout

9.3.2 Existing Sites

The use of existing sites is encouraged as is appropriate or required. Table 9-1 (below) provides name and address, tower type and height, building or shelter description, owner of property, and briefly lists existing radio equipment at each of the existing sites.

Site #	Name and Address	Tower Type and Ht.	Building/Shelter	Owner	Radio Equipment
1	Abbott Hill 222 Isaac Frye Hwy	Wooden Pole - 40 ft	Basement Room of Building	High Mowing School	VHF Control Stations, UHF Control Link
2	Federal Hill 347 Ponemah Hill Road	Steel Fire Lookout Tower - 85 ft	Site Built Wooden House	State of New Hampshire	VHF Low Band Repeater, VHF Highband Repeater
3	MACC Base Dispatch Center Milford Town Hall 1 Union Square	Rooftop Steel Guy Tower - 45 ft	Attic of the Town Hall	Town of Milford	VHF Control Stations, UHF Control Link, VHF Repeater
4	Mont Vernon Fire Station 3 Hardware Road	Steel Self- Supporting Tower - 60 ft	Attic of the Fire Station	Town of Mont Vernon	VHF Low Band Control Station, VHF High Band Control Station
5	Pead Hill 118 Pead Hill Road	2 Wooden Poles - 50 ft	Concrete Shelter	Town of Milford (Lease)	UHF Control Link, VHF Low Band Control Station, VHF High Band Control Station
6	Milford WW Treatment Plant 584 Nashua Street	Steel Guy Tower - 90 ft		Town of Milford	
7	Patch Hill Summer Street	Steel Self- Supporting Tower - 140 ft		U.S. Cellular	
8	Crown Caslte Dram Cup Hwy and McGettigan Road	Steel Self- Supporting Tower - 200 ft	Concrete Prefad Shelter	Crown Castle	

Table 9-1 Existing and Potential Radio / Microwave Sites

9.3.3 New Sites

New sites, leased or “greenfield”, will require various levels of development and construction as determined by the CONTRACTOR.

Greenfield sites shall be designed to accommodate three future 10 ft. by 16 ft. shelters. Ingress and egress shall be designed to allow for installation of these shelters or cabinets.

9.4 Utilities

9.4.1 Existing Utilities

Location of all existing utilities shall be verified before site work begins. Existing utilities must be protected during site work.

9.4.2 Temporary Electric Service

Temporary electric service may be necessary for site development. Temporary service must be coordinated and obtained through the local electric utility.

9.4.3 Permanent Electric Service

Permanent electric service must be coordinated and obtained through the local electric utility.

Underground service is preferred.

Depending on the site layout and the number of tenants at the site, electric meters and service disconnects may be located on a meter support structure near the fence so that meters may be read by utility personnel without entering the compound. At new sites, where additional future tenants are planned, two underground conduits each shall be installed from the service entrance point to planned locations of future shelters.

As much as possible, building or shelter electric service entrance should be located near coaxial cable and telephone service entrances.

The electric service ground shall be bonded to the site grounding system.

9.5 Earthwork

9.5.1 Geotechnical Investigations

Geotechnical investigations shall be performed at all sites involving earthwork. Geotechnical investigations and reporting shall be performed in accordance with ASTM D 420. Geotechnical reports shall be prepared and sealed by a professional engineer.

9.5.2 Erosion Control

An erosion control system shall be utilized to protect adjacent property in accordance with federal, state and local standards and specifications for soil erosion and sediment control.

All areas disturbed by construction activities shall be seeded or vegetated with grass or other plants that are indigenous to the local area. All seeded areas shall be covered with straw. Erosion control measures shall be removed when the site has been stabilized and erosion control measures are no longer necessary.

9.5.3 Materials for Fill, Sub-Grade Preparation and Backfill

Soils shall be classified by test procedures outlined in ASTM D 2487. Moisture-density relations shall be established in accordance with ASTM D 1557 for all fill material to ensure its suitability.

Material for fill and backfill beneath buildings, structures, and towers; for backfill adjacent to buildings, structures, and towers; for trench backfill in every location; and for sub-grade preparation shall be GW, GP, GM, GC, SW, SP, SM, or SC. The largest particles in this fill and backfill shall be no greater than 2 in. diameter.

Fill material for non-structural applications shall consist of unclassified material from the excavations.

9.5.4 Clearing and Grubbing

Fenced compounds, access roads and parking areas shall be cleared and grubbed of trees and other vegetation, stumps, roots and other material or structures that would hinder the development of the site. Such materials shall be removed to a depth of at least 18-in. Depressions made by grubbing shall be filled with suitable material and compacted as required.

Materials unsuitable for fill shall be removed from the site and disposed of in accordance with local, state and federal regulations.

9.5.5 Fills

Where fill is required to raise the subgrade for concrete slabs, fill material shall be placed in horizontal layers not exceeding 6-in compacted thickness. Frozen material shall not be used for this purpose.

9.5.6 Backfilling Beneath and Adjacent to Buildings, Structures and Towers

For depths greater than 5 ft, select fill shall be used from the top of the footing to a point 5 ft below finished grade. The select fill, defined as GW or SW material in ASTM D2487, shall extend from the outside and inside faces of the wall to the faces of the excavation if the excavation is sheeted and braced or 5 ft from the outside and inside faces of the wall if the excavation is un-sheeted.

9.5.7 Backfilling Trenches

Fuel pipe joints shall be left exposed for testing. After testing, trenches shall be backfilled with suitable materials free from large clumps of earth and rock fragments. Material shall be deposited in 6-in horizontal layers and thoroughly and carefully tamped until pipe and conduit have a cover of not less than 1 ft. Wrapped, coated and plastic material shall be backfilled 6-in above the utility line with sand or other finely graded material. For trenches in open areas, remainder of backfill material shall then be placed in the trench in one-foot horizontal layers.

Trenches shall be backfilled simultaneously on opposite sides and compacted simultaneously without dislocating the utility line from installed positions. For trenches beneath pavement, buildings and structures, the entire depth of the trench shall be filled in 6-in horizontal layers. Each layer shall be moistened or dried and compacted. Trenches improperly backfilled or where settlement occurs shall be reopened to depth required for proper compaction, refilled and compacted with surface restored to required grade and compaction, mounded over in open areas and smoothed off.

9.5.8 Plastic Marking Tape

Warning tapes shall be installed directly above pipe and conduit at a depth of 6-in below finished grade unless otherwise indicated. Tape color shall be as specified and shall bear a continuous printed inscription, identifying the specific utility.

Utility	Color
Electric	Red
Water	Blue
Telephone	Orange
Sewer	Green

9.5.9 Compaction

The degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557. Fill and backfill material shall be moistened or aerated as necessary to provide a moisture content that falls within 3 percent of either side of optimum.

The minimum compaction effort required for various fills, backfills, and sub-grades shall be as follows:

Fill, Backfill and Sub-Grade Compaction	Percent of Maximum Density
Under buildings, structures, towers, or adjacent to buildings, structures, or towers	95
Under exterior concrete slabs, including related utility trench backfill and scarified sub-grades	90
Under utility trench backfill in other areas	85

If required, field density tests shall be performed in accordance with ASTM D 1556 or ASTM D 6938.

9.5.10 Soil Sterilization

Areas specified to receive cover material shall be sterilized with a pre-emergent herbicide solution. Treatment shall be applied on the subgrade prior to placing cover material. Application shall be in accordance with the manufacturer's recommendations.

9.5.11 Fenced Compound

Inside the site fence (and guy anchor locations), geotextile fabric shall be installed in areas not covered by concrete. The geotextile fabric shall extend 18-in outside the fence. The fabric shall be installed in accordance with manufacturer's instructions. The area under the fabric shall be cleared and sterilized. The top covering over the fabric shall be 6-in of #57 aggregate compacted by roller.

9.6 Access Road

Access roads shall be 12 ft wide and shall be designed for H20 vehicle (as defined in AASHTO HB-17) surface loading. Road surfaces shall be at least 6-in of graded aggregate base course, compacted by roller.

Access roads shall be graded to provide positive drainage. Culverts shall be installed to prevent storm runoff from crossing the access road. Access roads shall be designed to allow for delivery of equipment shelters to the site. Access road entrances shall meet state or local requirements for driveway or uncontrolled intersection sight distances.

At some remote sites, an entrance barrier gate may be required across the access road at the entrance from the road. Entrance barriers shall be swinging tubular steel gates with standard padlock hardware. Entrance barriers shall be set at least 25 ft from the road. Entrance barriers shall be equipped with reflectors to increase visibility at night.

9.7 Parking Area

Outside each fenced site, there shall be adequate parking and turnaround space for two pickup trucks. The parking area shall be designed for H20 vehicle surface loading. The area shall be cleared, sterilized and covered with 6-in of #57 aggregate cover material compacted by roller.

9.8 Chain-Link Fencing

Chain-link fencing shall be installed around communications tower site compounds and around tower guy anchors. Fencing shall include locking gates and other accessories required to provide security for tower sites. Gates shall be equipped with reflectors to increase visibility at night. Appropriate signage shall be installed on the fence and entrance gates.

9.9 Bollards

Bollards shall be installed at the corners of shelters, generators and fuel tanks where these objects are exposed to vehicular traffic. Bollards shall be 4-in O.D. concrete-filled steel pipe.

9.10 Foundations

Concrete foundations for towers, shelters, generators, fuel tanks and other site equipment shall be designed and installed in accordance with ACI 318, ACI 301 and ACI 302 and other applicable standards of ACI.

9.10.1 Design

Foundation designs shall be based on the geotechnical conditions at the site. Foundations for towers shall be designed in accordance with TIA-222. All foundation engineering design documentation shall be prepared and sealed by a professional engineer.

9.10.2 Installation

Forms shall be used to ensure proper pouring and forming of foundations. Forms shall be true, rigid and strong enough to carry loads to which they will be subjected. Steel reinforcement, anchor bolts and other embedded items shall be held rigidly in place during pouring and curing of concrete. Concrete shall be vibrated during pours to eliminate air pockets. Care shall be taken to ensure that concrete does not freeze before curing.

9.10.3 Materials

Cement shall meet the requirements of ASTM C150. Aggregates shall meet the requirements of ASTM C33. Reinforcing steel shall meet the requirements for Grade 60 reinforcing steel as defined in ASTM A615. Minimum compressive strength of concrete shall be 3000 psf at 28 days or higher as specified by foundation design documentation.

9.10.4 Concrete Testing

During concrete pours, four test cylinders shall be poured in accordance with ASTM C31 for each 25-cu yd concrete poured. Concrete tests and test reports shall be in accordance with ASTM C39. If tests indicate that concrete strength is not adequate, the concrete shall be removed and replaced.

9.11 Towers

New towers and other antenna support structures shall be designed and installed according to TIA-222 and codes, ordinances and regulations of authorities having jurisdiction. Where these standards contain conflicting requirements, the more stringent requirements shall apply.

Upgrades to existing structures where new antennas or other equipment are to be installed shall meet the same requirements as new structures.

9.11.1 Tower Classification

Towers for the use of public safety or critical infrastructure industry communications systems shall meet the requirements of Class III structures as defined in TIA-222.

9.11.2 Loads

Each tower shall be designed by a professional engineer in accordance with TIA-222 so that its design strength exceeds the loading of the tower, antennas and appurtenances (antenna support hardware, waveguides and transmission lines, grounding kits, tower lighting systems, tower climbing systems, etc.), ice, wind, and seismic loads. As practical, transmission lines shall be evenly distributed on tower faces to distribute loads.

All proposed current and future loads, including antennas and appurtenances being relocated from existing structures, shall be carefully verified before tower analysis is performed. The following information for each proposed antenna shall be provided to the structural engineer:

- Manufacturer, model, size, weight and effective projected area of the following:
 - Antennas
 - Antenna support hardware
 - Transmission lines or waveguide
- Antenna mounting height
- Tower leg or face on which the antenna will be mounted
- Routing of transmission lines or waveguide

In addition to existing and new loads, tower shall be designed for the future installation of up to three heavy wireless carrier platforms as defined in TIA-222, Annex C.

9.11.3 Twist and Sway

Towers and antenna support structures for the support of microwave antennas shall be designed to meet the twist and sway requirements of the microwave system design as defined in TIA-222.

9.11.4 Analysis of Towers and Antenna Support Structures

A structural analysis shall be performed in accordance with TIA-222 on new towers and on existing towers where new antennas or other appurtenances are to be installed. The analysis shall be based on actual geotechnical conditions, not on “typical” soil parameters. The analysis shall state the model and all assumptions used and shall be prepared and sealed by a professional engineer.

9.11.5 Existing Tower Condition Assessment and Mapping

In order to analyze the structural strength and integrity of an existing tower or other antenna support structure, detailed information is required on the structure and its appurtenances. If this information is unavailable or insufficient, a tower condition assessment and mapping of appurtenances and structural components shall be performed in accordance with TIA-222, Section 15 and Annex J. The condition assessment and mapping shall be prepared and sealed by a professional engineer.

9.11.6 Materials and Fabrication

Materials and fabrication of all towers, guy assemblies, insulators and foundations shall meet the specifications of TIA-222.

9.11.7 Tower Erection

All work associated with the construction of towers shall be inspected and approved by a professional engineer. The erection of towers shall be in accordance with TIA-222. The tower shall be grounded continuously during erection.

9.11.8 Tower Climbing Facilities

A climbing ladder or other climbing facility shall be provided for each new tower in accordance with TIA-222. Each climbing facility shall be equipped with a safety climb device. Each tower shall be furnished with two personnel belts compatible with the safety climb device. Safety climb devices and personnel belts shall meet the requirements of ANSI/ASSE Z.359.

9.11.9 Obstruction Marking and Lighting

Towers shall be marked and lighted in accordance with FAA Advisory Circular AC 70/7460-1K. Where tower marking or lighting is required, dual lighting systems are preferred. Tower lighting systems shall meet the standards of FAA Advisory Circular AC 150/5245-43E.

Lighting equipment shall be the same throughout the system to permit commonality of spare parts.

Lighting control systems shall be mounted inside the equipment building and shall have alarm outputs for connecting to remote alarm systems. Alarm outputs shall be wired to the radio system alarm system and displayed at the associated alarm system workstations.

9.11.10 Ice Bridges

An ice bridge shall be installed between the communications shelter and the tower to support and protect transmission lines and other cables. The ice bridge may be self-supporting, or it may be supported at one or both ends. Where the ice bridge is supported at both ends by the shelter and the tower, one of those supports must be electrically insulated to prevent the flow of lightning surge currents through the ice bridge.

9.11.11 Cable Installation

Vertical transmission line runs on towers shall be installed neatly on cable ladders. Horizontal transmission line runs between the tower and the building shall be protected by an ice bridge. Drip loops or another method to prevent water entry into the shelter shall be utilized.

Cables shall be installed as follows:

- Ice bridges shall be supported by angle brackets. Threaded rod assemblies shall be used to support the angle brackets.
- Cable hangers and hoists shall be installed per cable manufacturer's recommendations.
- For single or multiple cable entry ports, a rubber boot, clamp, and copper panel shall be used at the cable entry bulkhead.
- Cables shall be secured by hardware specially designed for the cable. Tie-wraps are not acceptable means of securing cables to cable ladders or ice bridges. They may be used to secure cables to cable tray.

9.11.12 FAA Notifications

The FAA shall be notified of proposed or actual construction or alteration by completing FAA Forms 7460-1 and 7460-2 and providing supporting data.

9.11.13 OPTION: Security Cameras on Tower Structure

Security cameras shall be provided by the CONTRACTOR and mounted to the tower structure to provide security to the site. Security cameras shall be movable to provide security to surrounding areas.

9.12 Equipment Shelters – Arrangement & Size

All new radio communications equipment shelters shall be bullet-resistant, prefabricated shelters that meet industry standards and the specifications stated herein. Shelters shall be weatherproof and insulated as required by local climate. The roof shall be designed to survive the impact of falling ice. Floors shall be designed for at least 300 psf. Walls and doors shall be bullet-resistant. All building penetrations shall be sealed.

Equipment shelters shall be sized to house the new radio and connectivity network equipment, existing equipment moved from existing shelters and at least four future 2-ft by 2-ft racks.

A typical shelter arrangement is shown in Figure 9-2; however, other configurations will be considered to meet requirements. Equipment racks shall have a minimum clearance of 36-in front and rear. All exterior doors shall be provided with intrusion alarm sensors, which are to be connected to the radio system alarm reporting system. All building alarm connections are to be terminated at a building alarm bus using Type 66 connector blocks.

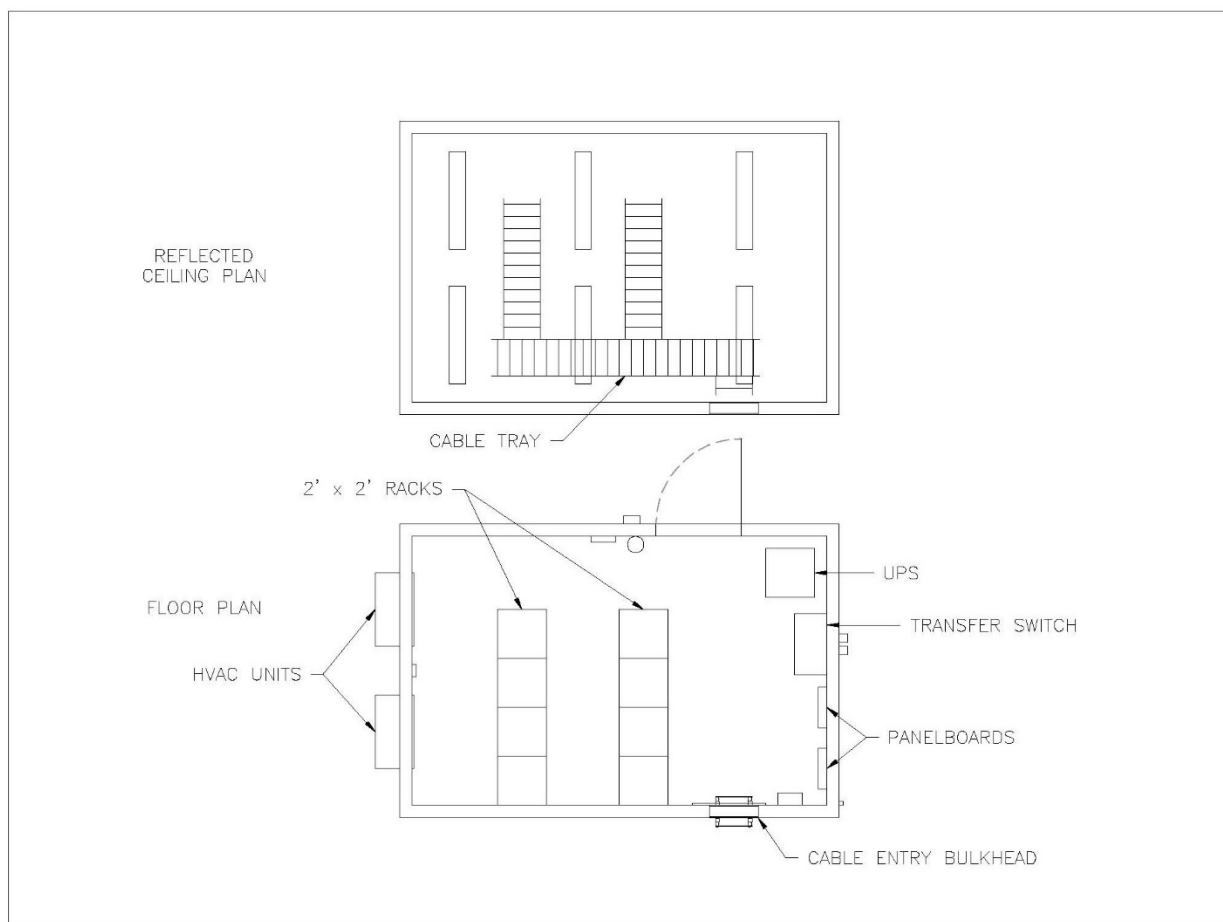


Figure 9-2 Typical Shelter Layout

9.13 Building Systems

9.13.1 HVAC

The heating and cooling system for the radio room shall be sized and selected based on ambient conditions as indicated in the current ASHRAE Handbook Fundamentals for the nearest area applicable

and shall include capacity for future building heat loads. The HVAC system shall be capable of maintaining an interior temperature between 70- and 75-degrees Fahrenheit. Heating for the radio room shall be sized to heat the room without equipment heat loads considered. Cooling system is to cool room with equipment, current and future, energized. Future equipment loads shall be assumed to be approximately 2 kW per additional 2 ft x 2 ft rack space.

The system shall consist of redundant units with either unit being able to carry the load. Redundant lead/lag controls with alternating timer allowing approximately equal operating time on each air conditioning unit shall be provided.

Load calculations shall be based on actual equipment loads, considering anticipated duty cycles and measured power consumption under operating conditions.

9.13.2 Fire Alarm System

Shelters shall be equipped with a fire alarm system. The fire alarm system shall meet the requirements of NFPA 72. Each zone shall have three detectors. When two of the three detectors enter an alarm condition, all louvers in the zone actuated shall be automatically closed.

9.13.3 Electrical System

9.13.3.1 Codes and Standards

Electrical and cabling work for each shelter shall conform to all local codes, NFPA 70, NFPA 101, ANSI C2 and local utility company standards.

Where a product is commercially available as a UL-listed device, a UL-listed device shall be used.

9.13.3.2 Electrical System Design

The general design of the electrical system shall be in accordance with the one-line diagram shown in Figure 9-3.

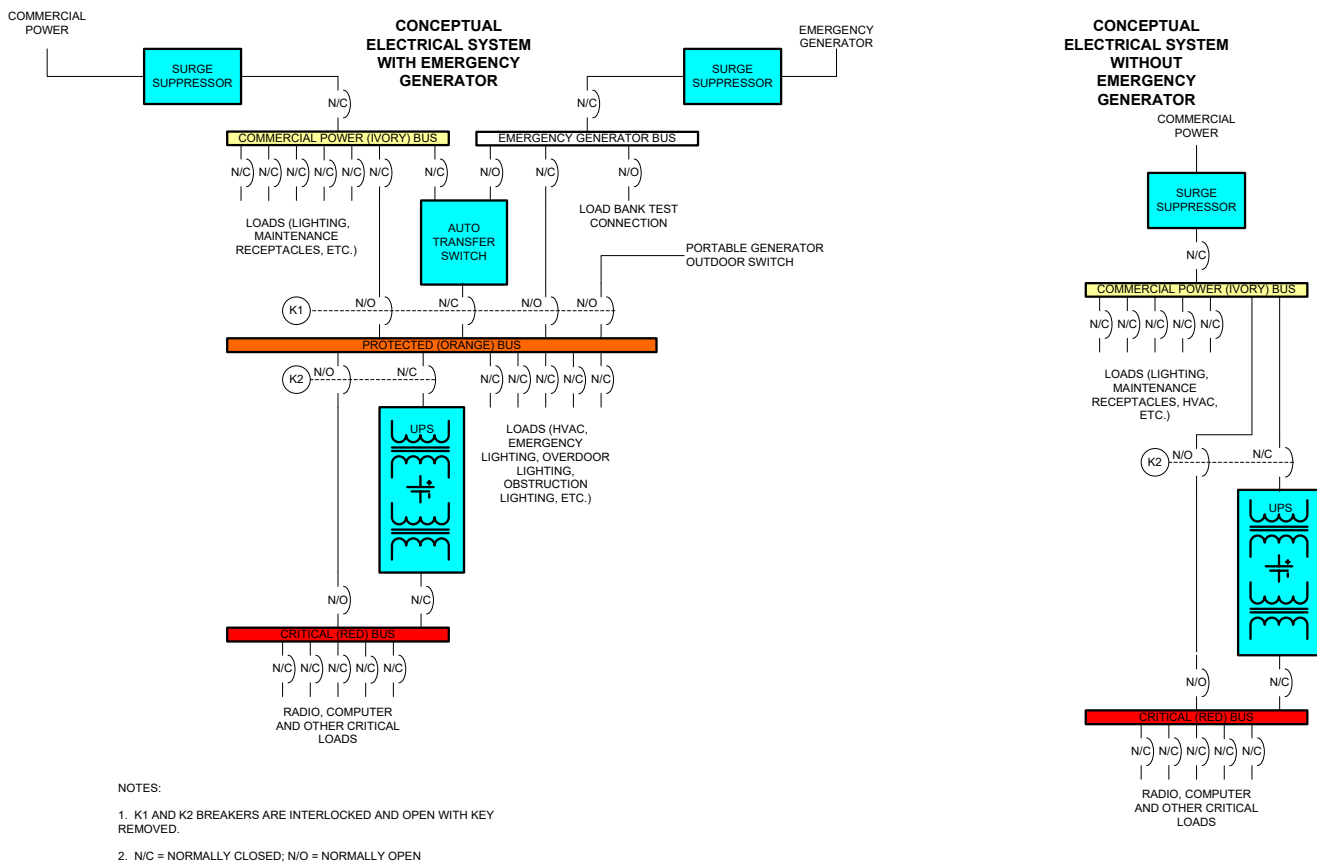


Figure 9-3 Typical Shelter One-Line Diagram

9.13.3.3 Buses

All equipment critical to the proper uninterrupted operation of the communications system shall be served by the critical bus or panelboard, which shall be served by an uninterruptible power supply (UPS).

All equipment that may accept brief temporary interruptions (such as HVAC equipment) or has its own integrated emergency power supply (such as emergency lights) shall be served by the protected bus or panelboard, which shall be served by an emergency generator.

All other equipment not essential to the operation of the communications system may be served by the service bus or panelboard, which will be without power during electric service power failures. Service circuits shall not be run in the same conduit or raceway as critical or protected circuits.

The service bus may be eliminated and all circuits that would be served by the service bus served by the protected bus.

9.13.3.4 Bypass Switches

Manual switches shall be provided to allow complete bypass and isolation of the UPS and the automatic transfer switch for maintenance purposes. The switches shall utilize keyed interlocks (Square D Kirk Key interlocks, or equivalent) to prevent simultaneous connection of more than one power source to the bus. Out-of-position switches (i.e. bypass operation) shall be an input to the radio system alarm system.

9.13.3.5 Temporary Backup Generator

Provisions shall be made for placement and connection to the electrical system of a mobile generator outside the shelter in case the permanently installed standby generator fails. Standby generator operating instructions shall be posted in the room or outdoor cabinet.

9.13.3.6 Surge Suppression

The service entrance and the emergency generator output shall each have independent, appropriately designed surge suppression devices installed. Additionally, because of potential operation with the UPS bypassed, all critical (red) bus branch circuits shall be supplied with surge protection devices at the output of the UPS. Devices shall incorporate current technology and as a minimum should utilize metal oxide varistors (MOVs), gas tube devices and/or equivalent avalanche protection. These units shall have contact alarm and visual indication for device failure.

9.13.3.7 Equipment and Raceways

Minimum conduit size shall be 3/4-in and all except underground conduit shall be of metal with a zinc coating (EMT or heavier construction). Conduits exposed to the outside shall be rigid, not EMT. Underground conduit shall be 2-in or larger rigid PVC with a minimum of 20 percent excess capacity over code limits, or spare underground conduits shall be included.

9.13.3.8 Receptacles and Plugs

Shelters shall be equipped with one 20-amp double duplex receptacle every 10 feet or closer as required by local codes, around the interior perimeter of each shelter. A minimum of two 20-amp circuits shall be provided for this purpose with one circuit supplied from the protected bus using orange receptacles and one circuit supplied from the service bus using ivory receptacles. One exterior 20-amp GFCI receptacle on its own circuit shall be installed on the service bus. Where power cords are plugged into overhead receptacles, twist lock components shall be used.

9.13.3.9 Lighting

Shelter interior lighting shall be provided by fluorescent or LED (preferred) lighting to a level of 50 foot-candles at a working plane of 30-in above the floor. Fluorescent light fixtures shall be supplied with 0°F ballasts.

Exterior LED lighting is to be mounted on exterior wall at each exterior door. A pole-mounted LED light fixture shall be installed at the parking location to supply at least 2 foot-candles of light at the vehicles. This light should be equipped with a photocell for dusk-to-dawn operation.

9.13.4 Safety

Emergency eyewash stations and fire extinguishers shall be installed in the radio room.

9.14 Backup Power Systems

9.14.1 Standby Generators

Standby generators shall meet the requirements of a Class 96 (96 hr runtime), Type 60 (power restoration in 60 sec), Level 1 (failure could result in loss of human life) emergency power supply system (EPSS) as defined in NFPA 110 and the requirements of NFPA 70, Article 700.

Generators shall be sized to serve 125 percent of current and future facility electrical loads. Future equipment loads shall be assumed to be approximately 2 kW per additional 2 ft x 2 ft rack space.

Generators shall include control-panel and alarm functionality that provides remote, TCP/IP-based status, configuration, and control. Remote control functions shall include start/stop functionality.

9.14.1.1 Generator Location

Generators may be located inside (preferred) or outside buildings or shelters. Standby generators that are located outside of the building or shelter shall be located to protect against ice, moisture, vehicles, vandalism, and rodents.

The automatic transfer switch, line surge suppressors and associated equipment should be located inside the building or shelter unless space limitations dictate otherwise. The system shall be designed to facilitate on-site full load testing.

9.14.1.2 Generator Installation

Generators located outdoors shall be mounted on a concrete pad according to the generator manufacturer's recommendations.

Generators located indoors shall be mounted on spring deflection vibration isolators according to generator manufacturer's recommendations. A drip pan shall be installed beneath the unit to collect spills and leaks.

All electrical connections to the unit shall have a section of flexible conduit for vibration isolation. Generators shall have a drain with a plugged ball valve accessible from the outside of the enclosure for draining oil.

9.14.1.3 Automatic Transfer Switches

Automatic transfer switches shall perform site load to generator transfer with an adjustable timer of 1 to 5 minutes. The transfer switch shall retransfer the site load to restored commercial power with an adjustable timer of 1 to 5 minutes followed by an adjustable 5 to 20-minute generator cool down before shutting off. A make before break bypass switch shall be provided to disconnect the transfer switch and isolate it from the commercial AC power and all site load equipment. This feature will permit transfer switch maintenance and troubleshooting without disconnecting the AC power from the site equipment.

Operating manuals shall be supplied with each generator.

9.14.1.4 Starting System

Batteries shall be maintenance-free with sealed cells. A battery charger shall be utilized to maintain the amp-hour rating and sufficient starting power of the generator battery when the generator is not running. If water-cooled generators are provided for outdoor installations, crankcase heaters and jacket water heaters shall be provided to facilitate cold weather starting. All external generators shall have oil pan heaters.

9.14.1.5 Fuel System

The fuel tank shall be of an approved design and installed in accordance with the local building codes. Standby generators may be powered by liquified petroleum gas (LPG, propane). Fuel systems shall meet the requirements of NFPA 58 LPG Code.

The fuel tank shall be not less than 500 gallons.

9.14.1.6 Noise Abatement

Where standby generators are located within 1000 ft of residences or occupied buildings, generators shall be of a quiet design, with appropriate mufflers or other devices making the unit suitable for installation in residential locations. Noise emissions in all locations shall be limited to levels in compliance with state and local regulations. Outdoor generators shall be installed in sound-attenuating enclosures.

9.14.1.7 Alarms

Safety indications listed in NFPA 110, 5.6.5.2 as Remote Audible shall be inputs to the radio system alarm system. Standby generator run status shall also be an input to the alarm system. Because sites are generally unmanned, audible alarms at the sites shall not be required.

9.14.1.8 Spare Parts

To reduce the need for spare parts inventories from various vendors, backup/standby generators should be from the same manufacturer. "High-mortality" spare parts referenced in NFPA 110, 8.2.4 may be stored offsite if typically stocked by the generator owner or the local backup/standby generator repair facility.

9.14.2 Uninterruptible Power Supplies

At sites with a standby generator, the uninterruptible power supplies (UPSs) shall meet or exceed the functional requirements for a Type 0 (non-interruption of power), Class 0.25 (functions 15 min at full load), and Level 1 (protection of human life) device as specified in NFPA 111.

UPSs shall be of proven design. They shall meet the requirements of NFPA 70, Article 700 and the requirements for an Emergency Power System as defined in NFPA 111.

The UPS unit shall continuously protect and condition power for a fully loaded critical bus during normal operation. The UPS unit shall power all infrastructures (radio communications system equipment) for a minimum of 30 minutes.

UPSs shall provide TCP/IP Ethernet-based management facility, including SNMP network management and web-based status and configuration.

9.14.2.1 Emergency Shutoff

The UPS shall have an emergency shutoff switch on the UPS cabinet. Additionally, provisions shall be made to de-energize the facility by operation of a clearly marked emergency switch in proximity to the circuit breaker panel. To prevent inadvertent shutoff, two actions shall be required to engage any emergency UPS shutoff switch (i.e. lift a cover then push a switch, or similar).

9.14.2.2 Bypass Switch

For maintenance and troubleshooting, the UPS shall have an external manual switch that will bypass the UPS AC input to output and disconnect the UPS from the site load and AC input. This will be a make-before-break function switch design in such a way as to prohibit the loss of AC power to the site equipment during and after the switch transfer. The aforementioned switch shall contain a contact closure that will provide an indication that the bypass function has been activated. The contact closure shall be wired to the alarm system.

In the event of a UPS failure or reduction in output voltage, the UPS shall perform an internal automatic bypass from the AC input to the AC output. This function shall be designed so that AC power will be

continuous to the site equipment contingent on the presence of commercial or standby generator AC sources.

9.15 Grounding

All site grounding and lightning protection shall be in accordance with the National Electric Code and the grounding and surge protection requirements of ANSI J-STD-607 or:

- Motorola R56 – Standards and Guidelines for Communication Sites
- Harris AE/LZT-1234618/1 - Site Grounding and Lightning Protection Guidelines

9.15.1 Common Ground System

There shall be only one common ground system at a communications facility. Grounds for all systems and equipment (including electric service, telephone service, water pipes, etc.) and all metal objects at a site shall be interconnected to equalize voltage rise among all conducting objects at the communications site.

The ground system shall be designed to achieve an overall resistance of 5 ohms or less from any point in the ground system to ground.

9.15.2 Grounding Conductors

All grounding conductor sizes specified are minimum sizes. Flat metal straps or bars may be used in place of wire where the cross-sectional area of the strap or bar meets or exceeds the cross-sectional area of the specified wire.

Grounding-conductor insulation shall be green, green with a yellow stripe or marked with green tape or adhesive labels or otherwise colored green at termination points.

Grounding conductors shall be supported or secured at intervals of 3 ft or less.

Grounding conductors shall not be run in metal conduit unless the wire is permanently bonded at both ends of the conduit. PVC conduit is preferred.

9.15.2.1 Exterior Grounding Conductors

Unless otherwise stated, exterior grounding conductors shall be solid or stranded, bare copper. Solid conductors are preferred.

Conductors installed below grade or partially below grade shall be #2 AWG (American Wire Gauge) solid. Below-grade conductors larger than #2 AWG may be stranded. If below-grade conductors are stranded, tinned copper conductors are recommended.

Unless otherwise stated, exterior conductors installed entirely above grade shall be #6 AWG. Insulated conductors are preferred for above-grade conductors.

Conductors bonded to galvanized steel shall be tinned, bare copper.

9.15.2.2 Interior Grounding Conductors

Interior grounding conductors shall be tinned or untinned stranded copper wire. Interior grounding conductors shall be insulated unless otherwise specified.

9.15.2.3 Grounding Conductor Bends

Grounding conductor lengths shall be kept as short as possible with the minimum number of bends. Conductor bends shall exceed an 8-in radius with an included angle of at least 90 degrees. Bends made at connection points shall turn in the direction of earth ground.

9.15.3 Grounding Equipment

Where a product is commercially available as a UL-listed device, a UL-listed device shall be used.

9.15.4 Connections

Above- and below-grade connections to the grounding electrode system shall be made by exothermic welding or irreversible high-compression connectors.

All other above-grade connections shall be made using exothermic welding, lugs, compression connectors, clamps or other approved means. Connectors shall be designed for the size and type of grounding conductor(s), the surface being grounded, and the metals being bonded. An anti-oxidation compound shall be applied to the surfaces of all mechanical connections.

Where lugs are used, two-hole lugs are preferred. Lugs may not be stacked; each lug shall be in direct contact with the surface to which it is being bonded.

The removal of galvanization for the purpose of grounding is strictly prohibited.

When making connections between dissimilar metals, precautions must be taken to prevent deterioration of grounding surfaces or protective surfaces.

9.15.5 Exterior Grounding System

An exterior grounding system consists of a grounding electrode system, tower ground bar, external building grounding bus bar and grounding conductors from ground bus bars, towers, buildings, fences, cable bridges, generators and fuel tanks.

9.15.5.1 Ground Rods

Ground rods shall be solid copper, hot-dipped galvanized steel, copper-clad steel or stainless steel, at least 5/8-in diameter and 8 ft. long.

Ground rods shall be driven into the earth using appropriate tools. The depth of the upper end of the ground rod shall be at the same depth as the ground ring, at least 30-in below grade. If a ground rod cannot be driven straight down the total length of the ground rod, it shall be driven at an angle not greater than 45 degrees. Auguring and backfilling are not permissible unless used in conjunction with doping.

Maximum distance between ground rods shall be twice the length of a single ground rod.

9.15.5.2 Electrolytic Ground Rods

Electrolytic ground rods may be used in locations with poor soil conductivity or limited space where standard ground rods are insufficient to provide a low-impedance ground. Electrolytic ground rods should be considered for use in locations where the grounding electrode system will be covered by pavement or concrete. Electrolytic ground rods shall be UL-listed, maintenance-free and shall meet all federal, state and local environmental regulations.

9.15.5.3 Ground Plates

Ground plates may be used in special locations where conditions prevent the use of standard ground rods. Ground plates shall be at least 0.06-in thick with a surface area of at least 2 sq ft. They shall be installed at least 30-in below grade.

9.15.5.4 Doping of Ground Systems

Doping of the soil may be necessary to enhance soil conductivity or protect the grounding electrode system from highly acidic soils. The doping material is added around the ground rod in an augured hole or around a conductor in a trench. The doping material shall have a constant cured resistivity of 12 ohm-cm or less. It shall set up to a hard, permanent material and shall not decompose or dissolve over time. It shall not require any maintenance after installation. It shall not accelerate corrosion of the grounding system. The doping material shall meet all federal, state or local environmental regulations.

9.15.5.5 Grounding Electrode System Conductors

Grounding electrodes shall be interconnected by grounding electrode system conductors to create the grounding electrode system. Grounding electrode system conductors shall be #2 AWG. Grounding electrode system conductors shall be installed at least 30-in below grade.

9.15.5.6 Ground Rings

Ground rods shall be interconnected to form a ground ring around each tower and communications shelter. Tower ground rings shall be installed at least 2 ft beyond tower foundations. Building ground rings shall be installed 3 ft beyond building foundations or 2 to 6 ft beyond the roof dripline.

All ground rings at a site shall be connected to each other with at least two #2 AWG wire.

9.15.5.7 Ground Radials

Ground radials are recommended at lightning-prone sites, sites with high soil resistivity or sites normally occupied. Radials may be 25 to 80 ft in length. They shall be cut to different lengths to prevent resonance. Radials shall be equally spaced and radiate from the tower ground ring. They shall be installed 30-in below grade. Ground rods shall be installed and connected to the radials separated by no more than the sum of their lengths.

9.15.6 Grounding of Towers and Other Antenna Support Structures

The following sections provide general instructions for grounding towers and other antenna support structures. Special situations, such as the use of cathodic protection systems, shall be designed by a professional engineer specializing in the design of these systems.

Drilling holes in towers or loosening tower bolts to install grounding is strictly prohibited.

9.15.6.1 Steel Monopoles

Steel monopoles shall be bonded to a tower ground ring by four #2 AWG wires. The ground ring shall consist of at least four ground rods.

9.15.6.2 Self-Supporting Towers

Each leg of a self-supporting steel lattice tower shall be bonded to a tower ground ring by #2 AWG wire. The ground ring shall consist of at least one ground rod per leg with additional ground rods as required to keep the distance between ground rods to less than twice the length of a single ground rod.

9.15.6.3 Guyed Towers

The base of a guyed tower shall be bonded to a tower ground ring by three #2 AWG wire. The grounding conductors shall be bonded to the ground ring within 2 ft of the ground rods. The ground ring shall consist of at least three ground rods.

At each guy anchor point, a ground rod shall be installed approximately 2 ft from the anchor footing. Guy wires shall be bonded to the ground rod by one #2 AWG wire. The grounding conductor shall be connected to the guy wires using UL-listed mechanical clamps. Exothermic welds are not allowed.

Where the guys are anchored within the fenced site compound, each ground rod shall be tied back to the tower ground ring below ground, using #2 AWG wire.

9.15.6.4 Antenna Support Structures on Buildings

Buildings on which an antenna support structure is mounted shall have a lightning protection system designed and installed in accordance with NFPA 780. A typical lightning protection system has a grounding conductor around the perimeter of the roof and at least two down conductors to the grounding electrode system. The lightning protection system may be bonded to building steel in at least two locations in lieu of the down conductors. Metal objects on the roof shall be bonded to the lightning protection system.

For a roof-mounted, self-supporting steel lattice tower, the tower legs shall be interconnected with #2 AWG wire to form a tower ground ring. The tower ground ring (or the base plate of antenna masts or guyed towers) shall be bonded to the lightning protection system by two #2 AWG wires. The conductors shall be extended in opposite directions and bonded to the lightning protection system within 2 ft of a down conductor or a connection to building steel.

Guy wires associated with towers on top of buildings shall be grounded at their anchor points to the lightning protection system in a similar manner.

9.15.6.5 Ice Bridges

Each support post of an ice bridge shall be bonded to the grounding electrode system by a #2 AWG wire. The ice bridge shall be bonded to each support post by #6 AWG wire. If the ice bridge consists of more than one section, the sections shall be bonded together by #6 AWG jumpers.

Where the ice bridge is supported by the tower and/or the building and does not have support posts, the following shall apply:

- Where an ice bridge is supported by the tower, it shall be bonded to the tower and electrically isolated from the building. Bonding to the tower may be accomplished by multiple mechanical connections or by bonding the ice bridge to the tower by a #6 AWG wire, to the TGB by a #6 AWG wire, or directly to the grounding electrode system by a #2 AWG wire in flexible non-metallic conduit.
- Where an ice bridge is supported by the building, it shall be bonded to the building and electrically isolated from the tower. At the building, the ice bridge shall be bonded either to the external ground bus bar by a #6 AWG wire or directly to the grounding electrode system by a #2 AWG wire.
- Where an ice bridge is supported by both the building and the tower, the tower end shall be isolated from the tower by an insulating slip-joint device. At the building, the ice bridge shall be bonded either to the external ground bus by a #6 AWG wire or directly to the grounding electrode system by a #2 AWG wire. At the tower, the ice bridge shall be bonded directly to the grounding electrode system by a #2 AWG wire in flexible non-metallic conduit.

9.15.6.6 Tower Ground Bus Bar

A tower ground bus bar (TGB) shall be mounted at the base of each tower or antenna support structure below the point where transmission lines turn toward the communications building or room. The TGB shall be solid copper at least 2-in wide and 0.25-in thick mounted on 2-in insulators. In locations where the tower is not protected from runoff from the TGB, the TGB shall be tinned. The length of the TGB and the number of conductor mounting holes are determined by the expected current and future number of conductors to be attached.

The TGB shall be bonded to the grounding electrode system by a #2 AWG tinned, solid, bare copper wire in flexible non-metallic conduit. In addition, the TGB may be bonded to the tower either directly using approved hardware or by a jumper.

Additional TGBs may be installed on the tower for the grounding of transmission line grounding kits. These TGBs shall be bonded to the tower by #2 AWG tinned, solid, bare, copper wire.

9.15.6.7 Transmission Lines

The outer conductor of each transmission line shall be grounded with appropriate coaxial cable grounding kits. These shall be installed per manufacturer's recommendations at a minimum of three locations:

- At the top of the vertical run near the antenna. The grounding kit conductor shall be connected to a vertical structural member of the tower using the clamp provided with the grounding kit or to a TGB using an appropriate two-hole lug.
- At the bottom of the vertical run, just above where the transmission line turns from the tower toward the communications building or room. The grounding kit conductor shall be connected to the TGB using an appropriate two-hole lug. This point shall be as low to the ground as feasible.
- Immediately outside the cable entrance to the equipment building, just ahead of the coaxial suppressor. The grounding kit conductor shall be connected to the external ground bus bar (EGB) using an appropriate two-hole lug.

Additional grounding bonds shall be installed to keep the distance between grounding kits to less than 200 ft along the vertical run.

9.15.7 Grounding of Buildings or Shelters

9.15.7.1 Exterior Ground Ring

An exterior ground ring (EGR) shall be installed around the perimeter of each dedicated communications building or shelter. The EGR shall incorporate one ground rod at each corner of the building. As necessary, additional ground rods shall be added so that the maximum distance between rods is less than the sum of the length of the ground rods. A ground rod shall be installed directly below the transmission line entrance to the building.

9.15.7.2 Exterior Ground Bus Bar

An exterior ground bus bar (EGB) shall be mounted on the exterior of the building below the cable entrance panel. The EGB shall be solid copper at least 2-in wide and 0.25-in thick mounted on 2-in insulators. The length of the EGB and the number of conductor mounting holes are determined by the expected current and future number of conductors to be attached.

The EGB shall be bonded to the grounding electrode system by a #2 AWG wire. A larger size wire or copper straps are preferred.

As an option, the EGB may be eliminated where a cable entrance panel is installed that includes integrated coaxial ground clamps.

9.15.7.3 Cable Entrance Panel

The cable entrance panel shall be bonded to the EGB by a #2 AWG wire.

9.15.8 Grounding of Fences

All metal fences, including gates, within 6 ft of the grounding electrode system or any grounded object shall be bonded to the grounding electrode system as follows:

- Each corner fence post and each gate support post shall be bonded to the grounding electrode system by #2 AWG wire.
- The fence fabric near each corner bonding point shall also be bonded to the building ground ring using #2 AWG wire. The fence fabric bond should be made in at least three points down the fence fabric.
- Each gate shall be bonded to the gate support post by a flexible copper grounding conductor (#6 AWG wire or equivalent). The flexibility of the grounding conductor shall not be compromised by the bonding process.

9.15.9 Grounding of Metal Objects

The following items must be bonded to the grounding electrode system:

- Emergency generator and generator support base
- Fuel tanks and metal fuel pipes, whether above or below ground
- Electric service and telephone service ground systems
- Any other sizable metal object within 6 ft of the grounding electrode system or any grounded object

9.15.10 Interior Grounding System

9.15.10.1 Single-Point Grounding System

Communications buildings, shelters or equipment rooms shall have a single-point grounding system. All equipment and metallic objects shall be connected to the exterior grounding system at a single location.

To facilitate creation of a single-point ground, transmission lines, electric service, telephone circuits, etc. shall enter the communications building or shelter near one another and the master ground bus bar.

9.15.10.2 Master Ground Bus Bar

A master ground bus bar (MGB) shall be installed below the cable entry panel. The MGB shall serve as the single-point ground connection for all internal communications system equipment.

The MGB shall be solid copper at least 2-in wide and 0.25-in thick mounted on 2-in insulators. The length of the MGB and the number of conductor mounting holes are determined by the expected current and future number of conductors to be attached.

The MGB shall be bonded to the EGR by a #2 AWG wire. The grounding conductor shall extend downward from the MGB and exit the building at a 45-degree angle. The grounding conductor shall be run in flexible non-metallic conduit from the point it passes into the wall until it runs below ground.

9.15.10.3 Secondary Ground Bus Bars

Secondary ground bus bars (SGBs) may be installed in the same room or in other rooms as needed to simplify connections to the MGB. Equipment may be bonded to the SGB rather than directly to the MGB.

The SGB shall be at least 2-in wide and 0.25-in thick mounted on 2-in insulators. The SGB shall be bonded to the MGB by a #2 AWG wire.

9.15.10.4 Grounding of Surge Suppressors

Each coaxial surge suppressor installed at the cable entry point shall be bonded to the MGB by a #6 AWG wire.

As an option, a secondary ground bus bar (SGB) may be installed below transmission lines in order to facilitate grounding of multiple surge suppressors. The SGB shall be bonded to the MGB by a #2 AWG wire.

Some cable entry panels may include an integrated surge-suppressor SGB. This SGB is bonded directly to the EGR through the cable entry panel, so bonding to the MGB is unnecessary.

9.15.10.5 Interior Grounding Ring

An interior grounding ring (IGR, often called a halo ground) shall be installed around the perimeter of the equipment room. The IGR shall be mounted on 2-in insulators approximately 1 ft below the ceiling or 8 ft above floor level, whichever is lower. The IGR shall consist of two #2 AWG wires of approximately equal length. There shall be a gap between the two conductors of at least 4-in at the opposite end of the room from the MGB.

9.15.10.6 Connections to the Interior Ground Ring

Items mounted along the perimeter of the equipment room, including the following, shall be bonded to the IGR by a #12 AWG wire:

- Electrical panelboards and transient-voltage surge suppressors (TVSSs)
- Telephone terminal block enclosures and surge suppressors
- Emergency generators (if located indoors)
- Metal battery racks
- Doors
- Door frames
- Ventilation ducts
- Water pipes
- Electrical conduits
- Any significant metal object within 6 ft of any other grounded object

9.15.10.7 Equipment Grounding Bus

An equipment grounding bus (EGB) consists of a conductor bonded to the MGB or SGB and radiating outward to equipment locations. The EGB typically runs within cable tray. The EGB may have multiple taps to branch to multiple rows of equipment racks or cabinets. The EGB conductors shall be #2 AWG wire. EGB conductors shall be routed to minimize the distance from the equipment to the MGB or SGB.

9.15.10.8 Rack and Cabinet Ground Bus

A rack or cabinet ground bus (RGB) shall be installed at each rack or cabinet. The RGB shall be #6 AWG wire. The rack or cabinet shall be grounded to the EGB or the RGB by #6 AWG wire.

9.15.10.9 Grounding of Equipment

Each equipment chassis within a rack or cabinet shall be connected to the RGB by #12 AWG wire. Equipment grounds shall not be daisy chained. Communications equipment shall not be connected to the IGR.

All equipment, whether mounted in racks or cabinets or in some other manner, shall be connected either to the MGB, an SGB or an EGB.

9.15.10.10 Cable Trays

Cable trays shall be connected to the MGB by a #2 AWG copper wire. Cable tray sections shall be bonded together by #6 AWG copper wires.

9.15.11 Communications Center Grounding

A communications center ground bus (#2 AWG copper wire) shall be run under the flooring for each equipment row if possible, in a manner to allow each equipment to tie into this ground with a #6 AWG solid or stranded, green-insulated copper wire. The ground bus shall be short and direct with no sharp bends and shall not run parallel within 2-in of any power or signal leads. The ground bus shall connect to a single-point master ground bus bar, and then connect to the exterior building ground, except if no external ground system is being installed as part of the equipment installation. Any ground system installed shall be effectively connected to the existing building ground or electrical service ground.

Console bays shall be bonded together and shall be connected to the communications center ground bus with a short, direct run of #6 AWG or larger solid or stranded green-jacketed copper wire, avoiding sharp bends.

9.16 Surge Suppression

All power and communications circuits entering and exiting the communications shelter or room shall be protected by the application of appropriate surge protective devices (SPDs) employing metal-oxide varistors (MOVs) or silicon avalanche diodes (SADs).

9.16.1 Transmission Line Surge Protective Devices

All RF transmission lines, including unused spares, must be protected by coaxial SPDs. Transmission line SPDs shall be located within 2 ft of the entrance to the building, or if the communications equipment room is not near the building entrance, within 2 ft of the entrance to the communications equipment room. Coaxial SPDs shall be grounded as indicated above.

9.16.2 Electric Service Panelboard Surge Suppression

A Type 1 transient voltage surge suppressor (TVSS) shall be placed at on the source side of service entrance panels, and on the load side of transfer switches or distribution panels. The suppressor shall be installed in parallel via a circuit breaker sized according to the manufacturer's recommendation (typically 60-amp) rated for the interrupting current of the panel. The lead lengths from the protective devices shall be as short as possible. The TVSS enclosure shall be grounded to the IGR with #6 AWG wire. A remote status indicator must be available.

9.16.3 AC Power In-Line Protection

When the above TVSSs are used, no additional TVSSs are required on site. If main/branch panel TVSS is not available, each AC utility power line shall be equipped with a two-way surge protector.

9.16.4 Telephone Lines

All telephone lines, T1 lines, data and control lines (excluding all fiber-optic lines) entering a site shall be equipped with bi-polar, bi-directional Silicon Avalanche Diodes (SAD) surge protectors. The location for these protectors can be at the equipment or telephone patch panel depending upon the application. For these hazards, protectors shall be connected with a #6 AWG or larger solid copper wire or strap to either the equipment ground or telephone patch panel ground.

9.16.5 GPS Receiver

When a GPS receiver with an active antenna mounted outside of the building is employed, a GPS system coaxial protector shall be installed to protect against the surge from a GPS antenna. The protector shall be located between the GPS antenna and GPS receiver with a #6 AWG or larger solid copper wire or strap to connect to the equipment rack ground.

10 Abbreviations & Acronyms

Abbreviations and Acronyms List			
AASHTO	American Association of State and Highway Transportation Officials	E&M	Ear & Mouth
AC	Alternating Current	EGB	Equipment Grounding Bus
AC	Advisory Circulars	EGR	Exterior Ground Ring
ACI	American Concrete Institute	EIA	Electronic Industries Association
AES	Advanced Encryption Standard	EMT	Electrical Metallic Tubing
AM	Amplitude Modulation	EPSS	Emergency Power Supply System
ANSI	American National Standard Institute	ERP	Effective Radiated Power
ASCE	American Society of Civil Engineers	F1	First Fresnel Zone Height
ASHRAE	American Society for Heating, Refrigeration and Air-conditioning Engineers	FAA	Federal Aviation Administration
ASSE	American Society of Safety Engineers	FCC	Federal Communications Commission
ASTM	American Society for Testing and Materials	FDMA	Frequency Division Multiple Access
ATIS	Alliance for Telecommunications Industry Solutions	GC	Clayey Gravel
ATP	Acceptance Test Plan	GM	Silty Gravel
AUX I/Os	Auxiliary Inputs/Outputs	GP	Gravel Poorly Graded
AWG	American Wire Gauge	GPS	Global Positioning System
BER	Bit Error Rate	GUI	Graphical User Interface
C4FM/CQ PSK	Continuous 4-level Frequency Modulation / Continuous Quadrature Phase Shift Keying	GW	Gravel Well-Graded
CAD	Computer Aided Dispatch	HIPS	Host-Bases Intrusion Prevention Software
CD-ROM	Compact Disc Read-Only Memory	HVAC	Heating, Ventilation, and Air Conditioning
CFR	Code of Federal Regulations	Hz	Hertz
COTS	Commercial Off-the-Shelf	I/O	Input / Output
CPU	Central Processing Unit	ID	Identifier
DAQ	Delivered Audio Quality	IDU/ODU	Indoor Unit/Outdoor Unit
dB	Decibel	IEEE	Institute for Electrical and Electronics Engineers
dBm	Decibel-milliwatt	IESNA	Illuminating Engineering Society of North America
DC	Direct Current	IGR	Interior Ground Ring
DDR	Detailed Design Review	IP	Internet Protocol
DMZ	Demilitarized Zone	IRR	Instant Recall Recorder
DS1	Digital Signal 1	K	K factor
DS3	Digital Signal 3	KFD	Key Fill Device
DVD	Digital Video Disc	KMF	Key Management Facility
DVR	Digital Vehicular Repeater	LED	Light-Emitting Diode

Abbreviations and Acronyms List			
LMR	Land Mobile Radio	SAD	Silicon Avalanche Diodes
LPG	Liquefied Petroleum Gas	SC	Clayey Sand
MGB	Mater Ground Bus Bar	SGB	Secondary Ground Bus Bar
MHSB	Monitored Hot Stand-by	SHPO	State Historic Preservation Offices (National Register)
MoM	Manager of Managers	SM	Silty Sand
N/C	Normally Closed	SNMP	Simple Network Management Protocol
N/O	Normally Opened	SNMPv1	Simple Network Management Protocol Version 1
NECA	National Electrical Contractors Association	SNMPv2	Simple Network Management Protocol Version 2
NEMA	National Electrical Manufactures Association	SNMPv2c	Simple Network Management Protocol Sub-version 2
NEPA	National Environmental Policy Act	SNMPv3	Simple Network Management Protocol Version 3
NESC	National Electrical Safety Code	SP	San Poorly Graded
NFPA	National Fire Protection Association	SPD	Surge Protection Devices
NIST	National Institute of Standards and Technology	SSL	Secure Sockets Layer
nm	nanometer	STD	Standard
NMS	Network Management System	STS-1	Synchronous Transport Signal 1
NTP	Notice to Proceed	SW	Sand Well-Graded
O.D.	Outside Diameter	T1	T-Carrier
OC3	Optical Carrier 3	TGB	Tower Ground Bus Bar
OEM	Original Equipment Manufacturer	TIA	Telecommunications Industry Association
OET	Office of Engineering & Technology	TL1	Transaction Language 1
OTAP	Over the Air Programming	TSB	Telecommunications Systems Bulletin
OTAR	Over the Air Rekeying	TTL	Time to Live
P25	APCO Project 25	TVSS	Transient-Voltage Surge Suppressor
PA	Power Amplifier	TX	Transmitter
PC	Personal Computer	UHF	Ultra-High Frequency
PDF	Portable Document Format	UL	Underwriters Laboratories
PSF	Pounds-Force Per Square Foot	UPS	Uninterruptible Power Supply
psig	pounds per square inch gage	USB	Universal Serial Bus
PVC	Polymerizing Vinyl Chloride	VAC	Voltage Alternating Current
QoS	Quality of Service	VDC	Voltage Direct Current
RF	Radio Frequency	VHF	Very-High Frequency
RFP	Request for Proposal	VPN	Virtual Private Network
RGB	Rock or Cabinet Ground Bus	VSWR	Voltage Standing Wave Ratio
RSL	Received Signal Level	W	Watt
RTU	Remote Terminal Unit		
RX	Receiver		

Appendix A - Evaluation Criteria

Proposals will be evaluated based on the categories below. Each Proposal may receive up to 100 points, allocated as described below. The Proposal receiving the highest total score will be the recommended Proposal. The final evaluation and recommendation will be made in concert with Milford.

Category	Point Allocation
Pricing (30 Points)	
Infrastructure Costs	10
Subscriber Costs	10
15 Year Running Costs (Operations & Maintenance)	10
Technical (70 Points)	
System Configuration and Design	15
Coverage Adequacy	20
Responsiveness to the Intent of the Specification	10
Project Team & Organization	10
Warranty and Maintenance Service Organization	10
Schedule	5
Total Points Possible	100

Grounds for Rejection

A proposal may be rejected for any of the following reasons:

- Failure to provide a complete proposal, based upon the requirements of RFP Section 2.
- The proposed system is substantially incomplete, e.g. specified subsystems or interfaces to existing equipment are not proposed.
- The proposed radio system will not provide the capacity to support the number of users specified in the RFP.
- The proposed radio system provides inadequate coverage. For example, coverage may be considered inadequate if the PROPOSER's guarantee is 10 percent less than that specified in a single service area.
- The proposed radio system fails to substantially provide the specified functionality.
- The PROPOSER's schedule is unrealistic. A schedule may be deemed unrealistic if important tasks or milestones are omitted or if insufficient time is allocated to tasks, especially to tasks such as site acquisition.

Evaluation Categories

Pricing (30 Points Total)

The pricing evaluation is separated for three subcategories: Infrastructure Costs, Subscriber Costs, and 15 year running costs.

Infrastructure Costs (10 Points)

The infrastructure costs include all fixed equipment (Radio and Microwave systems), physical facilities (shelters, towers, generators, HVAC, access roads, etc.) all dispatch equipment (consoles, back-up control stations, logging

recorder, etc.), alarm system, software, all costs associated with acquisition, designing, staging, delivery, installation, construction, implementation, configuration, testing, cutover, and all services (project management, engineering, training, etc.).

Infrastructure cost includes all costs associated with acquisition, implementation and first-year operation of the base system, including the following:

- purchase or lease of sites or property
- lease of equipment room and/or tower space
- lease of connectivity network (e.g. fiber-optic)
- regulatory fees
- Setup and implementation of utilities
- Initial full tank of generator fuel

Where these costs are not included in the Proposal, they will be estimated by the evaluation team.

The following costs are excluded in the calculation of infrastructure costs:

- subscriber units (mobiles, portables, pagers, and control stations)
- warranty, operations, and maintenance
- contingent discounts
- options identified in the RFP
- options offered by the PROPOSER

Points will be awarded to each proposal based on the following formula:

$$PIC_n = \frac{MinIC}{IC_n} \times PIC_0$$

Where

PIC_n is the points awarded to Proposal n for this subcategory;
 $MinIC$ is the lowest Infrastructure Costs of all valid proposals;
 IC_n is the Infrastructure Costs of Proposal n ; and
 IC_0 is the total points allocated to this category.

Subscriber Costs (10 Points)

The subscriber costs include the following:

- Subscriber Units (mobiles, portables, pagers, control stations, etc.)
- Subscriber services (delivery, programming, installation)
- Required features and functionality specified by the RFP
- Accessories requested by Milford in the RFP Appendix C

Subscriber costs will be based on pricing information in the Price Proposal worksheet, provided that proposed subscribers are compliant with the RFP. Where proposed subscriber equipment is not compliant, the cost will be estimated based on proposed list prices for compliant subscriber equipment. If proposed list prices are unavailable for compliant equipment, the evaluation team will estimate the cost of compliant proposed equipment.

Points will be awarded to each proposal according to the following formula:

$$PSubCost_n = \frac{MinSubCost}{SubCost_n} \times PSubCost_0$$

Where

$PSubCost_n$ is the points awarded to Proposal n for this category;
 $MinSubCost$ is the lowest Subscriber Costs of all valid proposals;
 $SubCost_n$ is the Subscriber Costs of Proposal n ; and
 $PSubCost_0$ is the total points allocated to this category.

15 Year Running Costs (10 Points)

15 Year Running Costs include operations listing the following:

- 1-year warranty
- Years 2-15 maintenance plan
- Annual preventive maintenance and site inspections
- System refresh or any incremental upgrades required
- Software and system updates/upgrades
- Mobile/Portable radio replacement
- Site leases
- Equipment room and/or tower space leases
- Connectivity network leases
- Utilities
- Generator fuel
- Maintenance contracts (e.g. physical facilities)

Where these costs are not included in the Proposal, they will be estimated by the evaluation team.

These costs will be based on pricing information in the Price Proposal worksheets, provided that proposed warranty and maintenance services are compliant with the RFP. Where proposed services and support is not compliant, the cost will be estimated based on proposed prices for compliant services and support. If proposed prices are unavailable for RFP required services and support, the evaluation team will estimate the cost of compliant support.

Points will be awarded to each proposal according to the following formula:

$$P15YearCost_n = \frac{Min15YearCost}{15YearCost_n} \times P15YearCost_0$$

Where

$P15YearCost_n$ is the points awarded to Proposal n for this category;
 $Min15YearCost$ is the lowest 15 Year Running Costs of all valid proposals;
 $15YearCost_n$ is the 15 Year Running Costs of Proposal n ; and
 $P15YearCost_0$ is the total points allocated to this category.

Technical (70 Points Total)

System Configuration and Design (15 Points)

Evaluation points will be awarded for the proposed system configuration and design that meets the RFP requirements and will consider capacity (current and in the future), guaranteed coverage, planned locations with existing or new radio sites, connectivity network topology, simulcast design, interoperability, redundancy, reliability, functions, and features. If the evaluation team determines that the Proposal has not met the RFP requirements, the evaluation team will mark the non-compliance as a major exception at their discretion.

The following are examples of possible major exceptions, not meant to be an exhaustive or all-inclusive list:

Failure to propose all equipment and services necessary to provide a complete and working system as specified in the RFP:

- Proposing equipment that fails to meet specifications at numerous points, these exceptions are judged by the evaluation team that the PROPOSER's product line equipment could not meet the specifications
- Proposing equipment that fails to meet specifications at numerous points, these exceptions are judged by the evaluation team when the PROPOSER's product line equipment could meet the specifications, but the PROPOSER chose to propose a lower grade of equipment
- System modes of operation fails the ability of a user to perform his duties safely and efficiently
- A system configuration that grossly affects dependability
- System redundancy that is significantly less than specified in the RFP
- Coverage Guarantee is inadequate specified by the RFP
- System traffic loading capacity fails to meet current and future voice & data communications specified by the RFP
- Acceptance testing that is non-compliant with the RFP testing requirements
- Evaluation of whether an exception is major, or minor is at the discretion of the evaluation team

Points for this category will be awarded based on the higher score obtained by one of the following two methods:

1. Two points will be deducted for each major exception; or
2. Points will be awarded based on the following formula:

$$PConfig_n = \frac{E_1 + E_2 + \dots + E_N - E_n}{E_1 + E_2 + \dots + E_N} \times \frac{PConfig_0}{2}$$

Where

$PConfig_n$ is the points awarded to Proposal n for this category;
 E_n is the number of major exceptions found in Proposal n ;
 N is the number of valid proposals; and
 $PConfig_0$ is the points allocated to this category.

Coverage Adequacy (20 Points)

Evaluation points will be awarded according to coverage guaranteed. All PROPOSERS meeting the coverage specifications will be provided 100 percent of the points for this category.

For proposals not meeting the coverage specifications, a one-point deduction shall be assessed for each one percent inadequacy in meeting the specification in any service area. The lower of the guaranteed talk-in and talk-out percentage will be used for one deduction.

Responsiveness to the Intent of the Specifications (10 Points)

Points in this category will be allocated based on the following criteria:

Half of the points in this category will be awarded based on the evaluation team's determination of the difficulty experienced in evaluating a particular proposal. This is a measure in the anticipated quality of the Proposer's submittals during the contract. If there are sections of a proposal that requires clarification, or needs additional explanation, the evaluation team will submit a question. The total number of questions for each proposal will be calculated and points will be awarded using the following formula:

$$PQuestion_n = \frac{Q_1 + Q_2 + \dots + Q_N - Q_n}{Q_1 + Q_2 + \dots + Q_N} \times \frac{PResponse_0}{2}$$

Where

$PQuestion_n$ is the points awarded to Proposal n for this subcategory,
 Q_n is the number of clarification questions asked for Proposal n ,
 N is the total number of valid proposals; and,
 $PResponse_0$ is the points allocated to this category.

The other half of the points in this category will be deducted if minor exceptions in equipment or system specifications are found by the evaluation team. The following are examples of minor exceptions, though this list is not intended all-inclusive or exhaustive:

- Equipment proposed does not meet the specifications, however the PROPOSER has their product line that does meet the specifications. The PROPOSER had decided to offer a lower grade of equipment. Equipment proposed does not meet the specifications, and the PROPOSER's product line does not meet the specifications.
- Proposed equipment does not meet the specifications, and the Proposal has stated "Exception" in the Compliance section (Appendix B).
- Proposed equipment does not meet the specifications, but the Proposal has stated "Comply" or "Comply with Comments" in the Compliance section (Appendix B).
- Proposed equipment can meet the specifications and stated "Comply", but the Proposal would require purchasing additional system features or functions listed "optional".

Points will be awarded based on the following formula:

$$PMinorexpn = \frac{E_1 + E_2 + \dots + E_N - E_n}{E_1 + E_2 + \dots + E_N} \times \frac{PResponse_0}{2}$$

Where

$PMinorexpn$ is the points awarded to Proposal n for this subcategory,
 E_n is the number of minor exceptions found in Proposal n ,
 N is the number of valid proposals; and,
 $PResponse_0$ is the points allocated to this category.

Project Team and Organization (10 Points)

The technical evaluation team will make a judgment of the quality and capability of the PROPOSER's project team. This judgment will be used to determine points awarded. In making this judgment, the technical evaluation team will take into consideration the opinions of past and present customers of the PROPOSER and its subcontractors and past performance on similar projects (size and scope).

Warranty and Maintenance Service Organization (10 Points)

Half of the points in this category will be awarded to each PROPOSER who meets all warranty and maintenance requirements of the RFP, including the specified response times. Any PROPOSER not meeting all warranty specifications will have points deducted based on the evaluation team’s judgment of the severity of the warranty exception.

The remainder of the points will be awarded based upon the evaluation team’s judgment of the quality and capabilities of the service organization that will be performing warranty and maintenance service. This judgment will take into consideration the opinions of present and past customers of the service organization, past performance on similar projects, length of time in the area, and any recent changes in the service organization.

Schedule (5 Points)

All points in this category will be awarded to each PROPOSER that proposes a schedule that meets or exceeds the specified schedule. If the proposed schedule does not meet the schedule, points will be awarded based on the following formula:

If $Sched_n \leq RFPSched$, then

$$PSched_n = PSched_0$$

If $RFPSched < Sched_n < 2 \times RFPSched$, then

$$PSched_n = PSched_0 \times \left(2 - \frac{Sched_n}{RFPSched} \right)$$

If $Sched_n \geq 2 \times RFPSched$, then

$$PSched_n = 0$$

Where

$PSched_n$ is the points awarded to Proposal n for this category;
 $RFPSched$ is the number of days in the schedule specified in the RFP
 $Sched_n$ is the number of days in the schedule proposed in Proposal n ; and
 $PSched_0$ is the points allocated to this category.

Final Selection

Final selection will be made by the Town of Milford. Milford may reserve the right to reject any or all Proposals or any portion thereof; waive any informalities or irregularities; and to award this bid, in whole or in part, in the best interest of the Town of Milford.

Appendix B - Compliance Matrix

See attached excel file.

Appendix C - Responsibilities Matrix

See attached excel file.

Appendix D - Price Proposal Workbook and Instructions

1.0 General Instructions

ABSOLUTELY NO PRICE INFORMATION SHALL BE INCLUDED IN THE TECHNICAL PROPOSAL. TECHNICAL PROPOSALS CONTAINING PRICE INFORMATION MAY BE DISQUALIFIED.

The PROPOSER shall enter detailed pricing for the proposed system(s), equipment, software, and services in the Microsoft Excel workbook provided. The PROPOSER shall submit this completed workbook in its native Microsoft Excel format, failure to do so may result in rejection of the Proposal or loss of evaluation points. The PROPOSER shall submit all sheets in the Microsoft Excel pricing pages as a PDF included in the Price Proposal submission, failure to provide all pricing information as a PDF copy may result in rejection of the Proposal.

Although not encouraged, if the PROPOSER needs to provide additional pricing information, the PROPOSER may add additional sheets in the Microsoft Excel Pricing document and must also include this information in the PDF pricing submission. It is the responsibility of the PROPOSER to manually add these costs to the Project Summation worksheet, BELOW the existing table and manually provide new Total Base System Cost and Grand Total Costs. In all cases, the PDF submission of the Project Summation sheet shall be binding.

The following notes apply, as appropriate, to all the cost pages:

- The PROPOSER shall include all costs for a turnkey system related to each specified cost area.
- PROPOSER shall not bundle pricing, when line items are available to submit detailed pricing.
- PROPOSER shall complete each worksheet in the pricing pages to allow for detailed evaluation.
- Items with no associated cost shall be indicated by zero (0) dollars in the appropriate cost column.
- Items that are not required or not applicable to the proposed system shall be noted as "N/A", in the Note column, and no costs shall be included for these items.
- The PROPOSER shall enter costs not specifically requested in the "Other Related Costs" cells that have been provided in each section.
- Where costs for a line item are included as part of another line item, the PROPOSER shall reference the item number which included the cost.
- In case of calculation errors or inaccuracies in the submitted pricing forms, the unit pricing shall prevail.
- All equipment required for a complete operational system shall be assumed to be included in the total system cost.

Failure to adhere to the above notes may result in rejection of the Proposal or loss of evaluation points.

2.0 Specific Instructions

2.1 General Setup

The price forms are provided in the Microsoft Excel workbook file named “*Appendix D - Price Proposal Workbook.xlsx*”.

2.2 Color Definition

The colors black, gray, and white are used throughout this workbook to simplify data entry. **Data or text shall only be entered into gray cells.** Text and data shall not be entered in cells that are not gray, to do so will create errors on the workbook and may result in rejection of the Proposal or loss of evaluation points. If an error occurs the PROPOSER shall reach out to Milford immediately, in writing, to request a revised Appendix D.

2.3 Project Information

The first worksheet in the Price Proposal Workbook is labeled “Project Info” and should be completed first. The PROPOSER shall enter the date of submission, the PROPOSER legal name, and the site names into the gray cells (see Figure 2-1).

A	B
Client Name:	Town of Milford, New Hampshire
Project Name:	VHF P25 Conventional Radio System
Date:	Date Entered on "Project Info" Sheet
Vendor Name:	PROPOSER's Name Entered on "Project Info" Sheet
Site 1	Site 1 Name Entered on Project Info Sheet
Site 2	Site 2 Name Entered on Project Info Sheet
Site 3	Site 3 Name Entered on Project Info Sheet
Site 4	Site 4 Name Entered on Project Info Sheet
Site 5	Site 5 Name Entered on Project Info Sheet

Figure 2-1: Project Information Worksheet

2.4 Base Quote Totals

The worksheet labeled “Project Summation” is used to display all the section totals, total base system, project discount, grand total, maintenance, project options, and maintenance options. Project options and maintenance are not summed into the grand total price.

The worksheet contains formulas that pull the numbers from the individual sections worksheets and performs elementary arithmetic for adding and subtracting (see Figure 2-2). This page is for display purposes only and no information shall be added by the PROPOSER.

Each category below, with an alpha to the left, will take you to the corresponding sheet if clicked.

A	B	C
	Town of Milford, New Hampshire	
	VHF P25 Conventional Radio System	
	Date Entered on "Project Info" Sheet	
	PROPOSER's Name Entered on "Project Info" Sheet	
BASE QUOTE TOTALS		
	INFRASTRUCTURE COSTS	\$ -
A	PHYSICAL FACILITIES	\$ -
B	RADIO SYSTEM	\$ -
C	CONNECTIVITY NETWORK	\$ -
D	DISPATCH CENTERS	\$ -
G	SERVICES	\$ -
	SUBSCRIBER COSTS	\$ -
E	PUBLIC SAFETY SUBSCRIBER EQUIPMENT	\$ -
F	NON-PUBLIC SAFETY SUBSCRIBER EQUIPMENT	\$ -
G	SERVICES	\$ -
	TOTAL BASE SYSTEM	\$ -
H	PROJECT DISCOUNT - INFRASTRUCTURE	\$ -
H	PROJECT DISCOUNT - SUBSCRIBERS	\$ -
	GRAND TOTAL	\$ -
I	MAINTENANCE (Year 2 thru Year 15)	\$ -
J	MAINTENANCE OPTIONS	\$ -
K	PROJECT OPTIONS	\$ -

Figure 2-2: Project Summation Worksheet

2.5 Infrastructure Related Costs

Worksheets are included for the following categories of systems:

- Physical Facilities
- Radio System
- Connectivity Network
- Dispatch Centers

The PROPOSER shall use this worksheet to enter all related costs to systems, equipment, software, installation, and programming for that category. This includes the following:

- Equipment
- Install
- Qty

The format of these worksheets are shown in Figure 2-3.

Columns A and B list equipment and installation totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 (on each worksheet) is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item.

The PROPOSER shall denote all pricing information for each line item in the proposed system.

The next four columns are gray for PROPOSER input: Column F allows the PROPOSER to provide limited additional equipment details for each line item; column G is for equipment per unit costs; column H is for installation per unit cost; and column I is for the quantity of units. Columns J & K calculate total equipment and installation costs for that line item at site 1 (named location). The two cells in columns J & K above the site name total equipment and installation costs per site. Above these cells is a single cell that totals both equipment and installation costs per site.

Columns G - K are repeated for each site required in the PROPOSER's system design. The site names will be automatically populated from the information the PROPOSER entered on the Project Info sheet.

Town of Milford, New Hampshire		VHF P25 Conventional Radio System			Site 1 Name Entered on Project Info Sheet			
\$ -		Date Entered on "Project Info" Sheet			\$ -			
\$ -		PROPOSER's Name Entered on "Project Info" Sheet			\$ -			
Total Equipment	Total Install	Note Ref #	Description / Notes	Equipment	Install	QTY	QTY*Equipment	QTY*Install
A PHYSICAL FACILITIES								
A.1 Site Acquisition								
\$ -	\$ -		A.1.1 Purchase Cost				\$ -	\$ -
\$ -	\$ -		A.1.2 15 Year Lease Cost				\$ -	\$ -
\$ -	\$ -		A.1.3 Other items relating to Site Acquisition				\$ -	\$ -
\$ -	\$ -		A.1.4 Other items relating to Site Acquisition				\$ -	\$ -
\$ -	\$ -		A.1.5 Other items relating to Site Acquisition				\$ -	\$ -
A.2 Site Development								
\$ -	\$ -		A.2.1 Site Preparation				\$ -	\$ -
\$ -	\$ -		A.2.2 Fencing				\$ -	\$ -
\$ -	\$ -		A.2.3 Access Road & Parking				\$ -	\$ -
\$ -	\$ -		A.2.4 Site Grounding				\$ -	\$ -
\$ -	\$ -		A.2.5 Foundations				\$ -	\$ -
\$ -	\$ -		A.2.6 Last Mile Power				\$ -	\$ -
\$ -	\$ -		A.2.7 Other items relating to Site Development				\$ -	\$ -
\$ -	\$ -		A.2.8 Other items relating to Site Development				\$ -	\$ -
\$ -	\$ -		A.2.9 Other items relating to Site Development				\$ -	\$ -

Figure 2-3: Infrastructure Related Cost Sheet Layout

2.6 Subscriber Related Costs

Worksheets are included for the following categories:

- Public Safety Subscribers
- Non-Public Safety Subscribers

The PROPOSER shall use this worksheet to enter all related costs to equipment, installation, and programming for that category. This includes the following:

- Equipment
- Install/Program
- Qty

The format of these worksheets is shown in Figure 2-4.

Columns A and B list equipment and installation totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 (on each worksheet) is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item.

The PROPOSER shall denote all pricing information for each line item used for a specified subscriber unit.

Column F provides the total number, by Milford agency, for that line item. The next two columns are gray for PROPOSER input: column G is for equipment per unit costs; column H is for install/program per unit cost. The next column I has a mix of gray and white cells, the gray cell may be used to enter quantities and the white cells have pre-populated quantities based upon Milford agency needs. Columns J & K calculate total equipment and install/program costs for that line item for the Milford Agency. The two cells in columns J & K above the agency name total equipment and installation costs per site. Above these cells is a single cell that totals both equipment and installation costs per agency.

Columns G - K are repeated for each agency that will operate on the PROPOSED system.

A	B	C	D	E	F	G	H	I	J	K
Town of Milford, New Hampshire			VHF P25 Conventional Radio System							
			Date Entered on "Project Info" Sheet						\$ -	
			PROPOSER'S Name Entered on "Project Info" Sheet		1323				\$ -	\$ -
Total Equipment	Total Install	Note Ref #			Total QTY	Equipment	Install / Program	QTY	Milford Police Department	
									QTY*Equipment	QTY*Install
\$ -	\$ -		E PUBLIC SAFETY SUBSCRIBER EQUIPMENT						\$ -	\$ -
			E.1 Subscriber Programming		238			66	\$ -	\$ -
			E.2 P25 Mobile Radio (Conventional)							
\$ -	\$ -		E.2.1	Dual Control Head Dash Mount High-Tier (full keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.2	Dual Control Head Dash Mount Mid-Tier (limited keyboard)	30				\$ -	\$ -
\$ -	\$ -		E.2.3	Dual Control Head Dash Mount Basic-Tier (no keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.4	Dash Mount High-Tier (single-band, full keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.5	Dash Mount Mid-Tier (single-band, limited keyboard)	5				\$ -	\$ -
\$ -	\$ -		E.2.6	Dash Mount Basic-Tier (single-band, no keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.7	Trunk Mount High-Tier (single band, full keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.8	Trunk Mount Mid-Tier (single band, limited keyboard)	17			17	\$ -	\$ -
\$ -	\$ -		E.2.9	Trunk Mount Basic-Tier (single band, no keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.10	High-Tier Motorcycle (single band, full keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.11	Mid-Tier Motorcycle (single band, limited keyboard)	1			1	\$ -	\$ -
\$ -	\$ -		E.2.12	Basic-Tier Motorcycle (single band, no keyboard)	0				\$ -	\$ -
\$ -	\$ -		E.2.13	DVR (Digital Vehicular Repeater)	25			17	\$ -	\$ -
\$ -	\$ -		E.2.14	OTAP (required)	53			18	\$ -	\$ -
\$ -	\$ -		E.2.15	GPS Location Services option	0				\$ -	\$ -
\$ -	\$ -		E.2.16	PTT Cellular Application option	0				\$ -	\$ -
\$ -	\$ -		E.2.17	WiFi / LTE option	0				\$ -	\$ -
\$ -	\$ -		E.2.18	Bluetooth option	0				\$ -	\$ -
\$ -	\$ -		E.2.19	AES Multikey Encryption option	27			18	\$ -	\$ -
\$ -	\$ -		E.2.20	OTAR option	0				\$ -	\$ -
\$ -	\$ -		E.2.21	Other items related to Mobiles	0				\$ -	\$ -

Figure 2-4: Subscriber Related Cost Sheet Layout

2.7 Services Related Costs

Worksheet is separated into the following categories:

- Infrastructure Services
- Subscribers Services

The PROPOSER shall use this worksheet to enter all costs related to project management, engineering, testing, training, documentation for that category. This includes the following:

- Labor (services/qty)
- Out-of-Pocket (expenses/qty)

The format of this worksheet is shown in Figure 2-5.

Columns A and B list services and expenses totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item.

The PROPOSER shall denote all pricing information for each line item that is necessary for complete system services. The PROPOSER shall separate all necessary services for infrastructure and subscribers as outlined in the worksheet.

The next five columns are gray for PROPOSER input: Column F allows the PROPOSER to provide limited additional equipment details for each line item; column G is for labor services costs; column H is for quantity of labor services cost; column I is for out-of-pocket expenses; column J is for quantity of out-of-pocket expenses.

A	B	C	D	E	F	G	H	I	J
Town of Milford, New Hampshire		VHF P25 Conventional Radio System							
\$ -		Date Entered on "Project Info" Sheet							
\$ -		PROPOSER's Name Entered on "Project Info" Sheet							
Total Services	Total Expenses	Note Ref #	Description / Notes		Labor		Out-of-Pocket		
					Services	QTY	Expenses	QTY	
			G.1 INFRASTRUCTURE SERVICES						
\$ -	\$ -		G.1.1 Project Management						
\$ -	\$ -		G.1.2 System Design/Engineering						
\$ -	\$ -		G.1.3 Site Management						
\$ -	\$ -		G.1.4 Detailed Design Review						
\$ -	\$ -		G.1.5 Frequency Licensing						
			G.1.6 Training						
\$ -	\$ -		G.1.6.1 Site Support Training (Physical Facilities)						
\$ -	\$ -		G.1.6.2 System Admin/Management Training						
\$ -	\$ -		G.1.6.3 System Overview Training						
\$ -	\$ -								
\$ -	\$ -								
Total Services	Total Expenses	Note Ref #	Description / Notes		Labor		Out-of-Pocket		
					Services	QTY	Expenses	QTY	
			G.2 SUBSCRIBER SERVICES						
\$ -	\$ -		G.2.1 Project Management						
\$ -	\$ -		G.2.2 Fleet Mapping Workshop						
			G.2.3 Training						
\$ -	\$ -		G.2.3.1 Radio User Training						
\$ -	\$ -		G.2.3.2 Radio User Training - Web Based						
\$ -	\$ -		G.2.3.3 Radio Programming Software Training						
\$ -	\$ -		G.2.3.4 Train the Trainers						

Figure 2-5: Services Related Cost Sheet Layout

2.8 Project Discount Worksheet

Worksheet is separated into the following categories:

- Infrastructure Project Discount
- Subscribers Project Discount

The PROPOSER shall use this worksheet to insert any discount associated with the proposed system design. The format of this worksheet is shown in Figure 2-6.

Columns A copies the discount for each individual line item. Cell A3 sums all the discounts. Cell A2 is the negative of A3 and is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Column D/E are merged and shall be completed by the PROPOSER to provide a description of the discount offered. The PROPOSER shall complete Column F to provide the monetary discount offered.

The PROPOSER shall separate the discounts offered for infrastructure and subscribers as outlined in the worksheet.

A	B	C	D	E	F
Town of Milford, New Hampshire			VHF P25 Conventional Radio System		
			Date Entered on "Project Info" Sheet		
			PROPOSER's Name Entered on "Project Info" Sheet		
\$ -					
\$ -					
Total Discount		Note Ref #			Discount
			H.1	INFRASTRUCTURE PROJECT DISCOUNT	
				(To be Completed by Proposer)	
				Description	
\$ -				Infrastructure Discount	
\$ -				Infrastructure Discount	
\$ -				Infrastructure Discount	
\$ -				Infrastructure Discount	
\$ -				Infrastructure Discount	
\$ -					
\$ -					
Total Discount		Note Ref #			Discount
			H.2	SUBSCRIBERS PROJECT DISCOUNT	
				(To be Completed by Proposer)	
				Description	
\$ -				Subscriber Discount	
\$ -				Subscriber Discount	
\$ -				Subscriber Discount	
\$ -				Subscriber Discount	

Figure 2-6: Project Discount Related Cost Sheet Layout

2.9 Maintenance Related Costs (Years 2 through 15)

The PROPOSER shall use this worksheet to enter all project costs related to maintenance and spare parts for years 2 -15. The format of this worksheet is shown in Figure 2-7.

Columns A and B list services and spare parts totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item.

The PROPOSER shall denote all pricing information for each line item that is necessary for maintaining the implemented system. The PROPOSER shall separate all necessary services and spare parts for complete maintenance as outlined in the worksheet.

The next two columns are gray for PROPOSER input: Column F is for 2nd year maintenance services costs; column G is for 2nd year spare parts costs. Columns F & G are repeated for each year of maintenance costs, through year 15.

A	B	C	D	E	F	G
Town of Milford, New Hampshire			VHF P25 Conventional Radio System			
			Date Entered on "Project Info" Sheet		\$ -	
			PROPOSER's Name Entered on "Project Info" Sheet		\$ -	\$ -
Total Services	Total Spare Parts	Note Ref #			2nd Year Maintenance	
					Services	Spare Parts
			1 MAINTENANCE (Year 2 thru Year 15)			
			1.1 Non-Radio Systems			
\$ -	\$ -		1.1.1	Generator Service Contract (One Year)		
\$ -	\$ -		1.1.2	Battery System		
\$ -	\$ -		1.1.3	UPS		
\$ -	\$ -		1.1.4	HVAC System		
\$ -	\$ -		1.1.5	Fire Suppression System		
\$ -	\$ -		1.1.6	Logging Recorder		
\$ -	\$ -		1.1.7	Other items relating Non-Radio Systems		
\$ -	\$ -		1.1.8	Other items relating Non-Radio Systems		
			1.2 Preventive Maintenance per year			
\$ -	\$ -		1.2.1	Fixed Equipment/Radio System		
\$ -	\$ -		1.2.2	Connective Network / Microwave System		
\$ -	\$ -		1.2.3	Console System		
\$ -	\$ -		1.2.4	Dispatch Equipment		
\$ -	\$ -		1.2.5	Other items relating Preventive Maintenance		
\$ -	\$ -		1.2.6	Other items relating Preventive Maintenance		
			1.3 Software Services Agreement			
\$ -	\$ -		1.3.1	System Software		
\$ -	\$ -		1.3.2	Subscriber Software		
\$ -	\$ -		1.3.3	Maintenance Software		
\$ -	\$ -		1.3.4	Other items relating Software Services		
			1.4 Other Maintenance Related Costs			
\$ -	\$ -		1.4.1	Other items relating to Maintenance		
\$ -	\$ -		1.4.2	Other items relating to Maintenance		

Figure 2-7: Maintenance Related Cost Sheet Layout

2.10 Maintenance Options Related Costs (Years 2 through 15)

The PROPOSER shall use this worksheet to enter all project costs related to maintenance options for 1st years warranty/maintenance and maintenance years 2 -15. The format of this worksheet is shown in Figure 2-8.

Columns A and B list services and spare parts totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item.

The PROPOSER shall denote all pricing information for each line item that is necessary for maintaining the implemented system. The PROPOSER shall separate all necessary services and spare parts for complete maintenance as outlined in the worksheet.

The next two columns are gray for PROPOSER input: Column F is for optional 1st year warranty/maintenance services costs; column G is for 1st year warranty/maintenance spare parts costs. Column H is for optional 1st year warranty/maintenance services costs; column G is for 1st year warranty/maintenance spare parts costs. Column H is for 2nd year optional maintenance services costs; column I is for 2nd year optional spare parts costs. Columns H & I are repeated for each year of optional maintenance and spare parts costs, thru year 15.

A	B	C	D	E	F	G	H	I
Town of Milford, New Hampshire			VHF P25 Conventional Radio System					
			Date Entered on "Project Info" Sheet		\$ -		\$ -	
			PROPOSER's Name Entered on "Project Info" Sheet		\$ -	\$ -	\$ -	\$ -
Total Services	Total Spare Parts	Note Ref #			1st Year Warranty / Maintenance		2nd Year Maintenance	
					Services	Spare Parts	Services	Spare Parts
			J	MAINTENANCE OPTIONS				
\$ -	\$ -		J.1	Software Enhancement Subscription				
\$ -	\$ -		J.2	Network Security Monitoring				
\$ -	\$ -		J.3	Full-Time Network Engineer				
\$ -	\$ -		J.4	Full-Time Technician				
\$ -	\$ -		J.5	Full-Time Radio Installer				
\$ -	\$ -		J.6	Maintenance for OTAP				
\$ -	\$ -		J.7	Maintenance for OTAR				
\$ -	\$ -		J.8	Maintenance for GPS Location Services				
\$ -	\$ -		J.9	Maintenance for Subscriber Units - Mobiles				
\$ -	\$ -		J.10	Maintenance for Subscriber Units - Portables				
\$ -	\$ -		J.11	Maintenance for Subscriber Units - DVR				

Figure 2-8: Maintenance Options Related Cost Sheet Layout

2.11 Project Options

The PROPOSER shall use this worksheet to enter all project costs related to options. The PROPOSER shall offer the options as described on this worksheet. If the PROPOSER desired to offer additional options, they may be included after the named options. The format of this worksheet is shown in Figure 2-9.

Columns A and B list equipment and installation totals per individual line item. Cells A3 and B3 sum all equipment and installation costs for the entire category. Cell A2 sums cells A3 and B3 together. The total from cell A2 is reported on the "Project Summation" worksheet and, if clicked, will take you to the Project Summation sheet.

If there are significant detailed notes the PROPOSER believes necessary, enter a designated note number next to the line item in column C and insert the note in the worksheet labeled "Notes" at the end of the Price Proposal Workbook. Columns D and E list numbers and titles of each line item. The lines that are gray may be used to describe the elements of each option.

The next two columns are gray for PROPOSER input: Column F is for equipment costs and column G is for installation costs.

A	B	C	D	E	F	G
Town of Milford, New Hampshire			VHF P25 Conventional Radio System			
\$ -			Date Entered on "Project Info" Sheet			
\$ -			PROPOSER's Name Entered on "Project Info" Sheet			
Total Equipment	Total Install	Note Ref #			System and Equipment	
					Equipment	Install
K PROJECT OPTIONS						
(To be Completed by Proposer)						
Project Option 1 - § 4.4.3.11 Critical Building Coverage Testing						
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
Project Option 2 - § 6.2.7.3 Over-the-Air ReKeying (OTAR)						
\$ -	\$ -			Key Management Facility (KMF)		
\$ -	\$ -			KMF Workstations		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
Project Option 3 - § 6.2.8 Inter-RF Subsystem Interface (ISSI)						
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		
\$ -	\$ -			Option Cost Element		

Figure 2-9: Project Options Related Costs Worksheet

2.12 Mandatory Unit Pricing Worksheet

The PROPOSER shall use this worksheet to enter subscriber equipment unit and unit installation costs that will be used for future purchasing. The PROPOSER shall offer the options as described on this worksheet. If the PROPOSER desires to offer additional options, they may be included after the named options. The format of this worksheet is shown in Figure 2-10.

This worksheet will not be included in the base quote total and will only be used as a reference in future purchasing by the Town of Milford. PROPOSERS shall enter necessary description/notes in the gray cells of column C, enter the per unit equipment cost in column D, and enter the per unit install and program costs in column E.

A		B		C		D		E	
		Town of Milford, New Hampshire VHF P25 Conventional Radio System Date Entered on "Project Info" Sheet PROPOSER's Name Entered on "Project Info" Sheet							
				Description / Notes		System and Equipment			
						Equipment		Install & Program	
L MANDATORY UNIT PRICING									
Future Subscriber Requirements:									
L.1 Dash Mount Mobile Radios									
L.1.1 Non-Public Safety - Single Band (e.g. Public Works, Schools)									
L.1.1.1	P25 Agency-Tier Conventional (full keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.2	P25 Agency-Tier Conventional (limited keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.3	P25 Agency-Tier Conventional (no keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.4	P25 Agency-Tier Trunked (full keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.5	P25 Agency-Tier Trunked (limited keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.6	P25 Agency-Tier Trunked (no keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.7	P25 Phase 2 Agency-Tier (full keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.8	P25 Phase 2 Agency-Tier (limited keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.9	P25 Phase 2 Agency-Tier (no keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.1.10	OTAP			Describe Accessories, Options, Software, etc.					
L.1.1.11	Programming			Describe Accessories, Options, Software, etc.					
L.1.1.12	Other items related to Dash Mount Mobile Radios								
L.1.1.13	Other items related to Dash Mount Mobile Radios								
L.1.1.14	Other items related to Dash Mount Mobile Radios								
L.1.2 Public Safety - Single Band - Dash Mount Mobile Radios									
L.1.2.1	P25 High-Tier Conventional (full keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.2.2	P25 Mid-Tier Conventional (limited keyboard)			List which models are capable of this option, and any pre-requisite software options					
L.1.2.3	P25 Basic-Tier Conventional (no keyboard)			List which models are capable of this option, and any pre-requisite software options					

Figure 2-10: Mandatory Unit Pricing Related Costs Worksheet

2.13 Notes

The PROPOSER shall use this worksheet to enter any detailed notes of explanation. The PROPOSER shall enter the following information: column A shall reference the specific worksheet to which the note corresponds; column B shall reference the assigned note reference # as entered in column C of the specified worksheet; and column C shall be the detailed notes of explanation.

A		B		C	
				Town of Milford, New Hampshire VHF P25 Conventional Radio System Date Entered on "Project Info" Sheet PROPOSER's Name Entered on "Project Info" Sheet	
Section (Worksheet)	Note Reference No.	Detailed Notes			

Figure 2-11: Notes Worksheet

Appendix E – Bid Bond Form

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we _____, as Principal, hereinafter called the Principal, and _____, a Corporation duly organized under the laws of the State of _____ as Surety, hereinafter called the Surety, are held and firmly bound unto the Town of Milford, New Hampshire, hereinafter called Milford, in the amount of _____ Dollars (\$_____), for the payment of which amount and truly to be made, the Principal and the Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Proposal for _____

NOW THEREFORE, if Milford shall accept the Proposal of the Principal and the Principal shall enter into a Contract with Milford in accordance with the terms of said Proposal, and give such bond or bonds as may be specified in the RFP and Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and materials furnished in the prosecution thereof, or in the event of the failure of the Principal to enter into such Contract and give such bond or bonds the Surety shall, upon demand forthwith, pay to Milford the amount set forth above. The Principal shall pay Milford the difference not to exceed the penalty hereof between the amount specified in said Proposal and such larger amount for which Milford may in good faith contract with another party to perform the work covered by said Proposal, then this obligation shall be null and void, otherwise to remain in full force and effect.

SIGNED AND SEALED this ____ day of _____, _____ in the presence of:

Witness _____ Witness _____

_____(SEAL) _____(SEAL)

Principal

Surety

Title

Title

5. Town Status Report

Town Status Report – August 10, 2020

- a. **Wireless Facility – 19 Garden Street Update** - On August 4th, AT&T appeared before the Planning Board and Board of Adjustment for a conceptual review (public meeting) to discuss a proposed 140' wireless telecommunications facility (120' lattice structure and 20' whip antenna) located in the northeast corner of the Police station property located at 19 Garden Street. As A&T explained, the 140' tower would support/meet both the carrier's and Town communication needs. Below, please find the conceptual plans and photo simulation of the tower.

https://www.milford.nh.gov/sites/g/files/vyhlf4701/f/agendas/m25_l67_conceptual_telecom_staff_review_08.04.2020.pdf

https://www.milford.nh.gov/sites/g/files/vyhlf4701/f/agendas/nh4146_sim_pkg_vss_llc_07072020_reduced.pdf

The conceptual review is a precursor for the submittal of a formal application whereupon the project is introduced to the members of the Planning Board (and Zoning Board in this instance) and they are able to ask preliminary questions. The benefit to applicant is that they receive input and guidance (non-binding) to assist and facilitate regulatory review/application process. This project is **NOT** related to or in conjunction with any other Town project.

- b. **Osgood Pond Dredging Project Phase II** – Phase II of the Osgood Pond Dredging Project, as voted on by the citizens of Milford, is continuing on schedule. The dredging began on July 6th and the project will be completed in the next couple of weeks. The Town will continue to work with the appropriate state partners to ensure the work is done in accordance with all appropriate state regulations and best practices. Any questions or concerns about the project can be directed to the Town Administrator's Office.
- c. **Town Hall Re-Opening** – Town Hall began its phased re-opening on July 28th with walk-ins welcome from 9:00-1:00 on Tuesdays and Thursdays. It was well received by our citizens. We will now expand those hours to all day on Tuesdays and Thursdays, 8:00 until 4:30 for all departments except for the Town Clerk's office. That office will continue to be open on Tuesdays and Thursdays from 9:00 to 1:00 only. All other options for obtaining services (i.e. drop boxes, online, appointments, by phone) are available at all times. Any questions or concerns about the project can be directed to the Town Administrator's Office.

9. Approval of Final Minutes - July 27, 2020

DRAFT

MINUTES OF THE MILFORD BOARD OF SELECTMEN MEETING

July 27, 2020

This meeting was conducted pursuant to State of New Hampshire Emergency Order #12 pursuant to Executive Order 2020-04, temporary modification of public access to meetings under RSA 91-A. As such, the meeting was conducted online using these connection instructions that were listed on the posted meeting agenda: "The Public is encouraged to participate remotely, call in on your phone @ 1-646-558-8656 and enter the meeting ID# 814 4605 1477 and the password is 150531, or join the Zoom Meeting @ <https://zoom.us/j/81446051477>. Please try to log in 5 minutes before the meeting's scheduled start time in case you run into any technical difficulties".

PRESENT: Gary Daniels, Chairman
Paul Dargie, Vice Chairman
Laura Dudziak, Member
Chris Labonte, Member
David Freel, Member

John Shannon, Town Administrator
Tina Philbrick, Recording Secretary
Andrew Kouropoulos, Videographer

1. CALL TO ORDER, BOARD OF SELECTMEN INTRODUCTIONS & PUBLIC SPEAKING INSTRUCTIONS:

Chairman Daniels declared that an emergency exists and he was invoking the provisions of RSA 91-A: 2, III (b). Federal, state, and local officials have determined that gatherings of 10 or more people pose a substantial risk to the community in its continuing efforts to combat the spread of COVID-19. In concurring with their determination, he also finds that this meeting is imperative to the continued operation of Town government and services, which are vital to public safety and confidence during this emergency. As such, this meeting will be conducted with a quorum of this body physically present in the same location, and two members participating via Zoom. Information for accessing this meeting can be found on the Town web site in the red banner.

Chairman Daniels welcomed members of the public accessing this meeting remotely. Even though this meeting is being conducted in a unique manner under unusual circumstances, the usual rules of conduct and decorum apply. Public comments will be limited to three to five minutes per person. Any person found to be disrupting this meeting will be asked to cease the disruption. If the disruptive behavior continues thereafter, that person will be removed from the meeting.

All votes that are taken during this meeting must be done by Roll Call vote. Members who called in from home were asked to state their name and state whether there was anyone in the room with them during this meeting, which is required under the Right-to-Know law.

Roll call attendance: Paul Dargie, yes and no one is present (remote). Selectman Dudziak, yes and no one is present (remote). Selectman Labonte, yes, Selectman Freel, yes, and Chairman Daniels, yes.

2. APPOINTMENTS: (Approximate times)

5:30 p.m. – Request to Appoint Tracy Quirk-Berube as an Alternate Member of the Library Trustees – Term expires 2021.

Tracy thanked the Board for their consideration for the position on the Board as an Alternate Library Trustee. She is excited about the opportunity to contribute her time and knowledge as an alternate library trustee. She is a long time resident of the Milford community and has always valued the library and the resources and support that are available to our community.

A motion was made by Selectmen Labonte to appoint Tracy Quirk-Berube as an Alternate Member of the Library Trustees. Seconded by Selectman Freel. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes, and Chairman Daniels yes. The motion passed 5/0.

5:35 p.m. – Fire Department Replacement Utility I Vehicle – Ken Flaherty, Fire Chief (tabled from 7/13/2020)

Chief Flaherty referenced a vehicle lost due to a fire on May 26th. Primex gave the town \$25,000 for replacement costs.

As of today, he was able to secure a white F250 super cab 4WD for \$32,500. The lights and lettering came to \$4,814. The cap was \$1,994, and a plow fitting was \$1,640. The total cost was \$40,929. They will need \$15,747.

Selectman Labonte asked if there was anything else other than a FORD that would fit the bill better. Ken said no, he searched everywhere. This one is coming from Massachusetts from Colonial Ford. No one stocks a standard duty pickup without all the bells and whistles.

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

62 **Selectmen Dargie made a motion to approve the purchase of a replacement vehicle as per Chief Flaherty's number**
63 **of \$40,929. Seconded by Selectman Dudziak. A roll call vote was taken with Selectman Dargie yes, Selectman Dudzi-**
64 **ak yes, Selectman Labonte yes, Selectman Freel yes, and Chairman Daniels yes. The motion passed 5/0.**
65

66 **5:45 p.m. – Polling Location Change – Pete Basiliere, Town Moderator**

67 In summary, the Board unanimously voted on May 26th, just before the statutory deadline, to move the location of the Sep-
68 tember and November locations from the Middle School gym to the Hampshire Dome at Hampshire Hills. The Middle
69 School gym was determined to be too small for the extensive social distancing rules due to COVID-19 regulations. The
70 High School gym and cafeteria will work out better especially for new voters. Pete explained why the café and gym would
71 work better for voting. Voters who choose not to wear a face mask/shield for medical or other reasons will use an alternate
72 on-site process.
73

74 Pete Basiliere would like the Board to rescind their decision to hold the September primary and November General elec-
75 tions at the Hampshire Dome, designate the Milford High School as the polling place and direct the appropriate staff to post
76 legal notices and create other signs and communications in multiple media areas that will inform citizens of the change.
77

78 Selectman Freel asked if there will be enough room in both the café and gym. Pete said the state said they will have the
79 same number of booths that are normally required. We anticipate a high number of absentee ballots, maybe as high as 50%.
80 They are hopeful that people will take advantage of the absentee ballots but recognize that people will also prefer to vote in
81 person.
82

83 Selectman Freel asked if we are aiming for not having as many booths. Pete said will have to set up all of the booths be-
84 cause they come in sets of five. If they reduce that number of booths required, it will make it easier to remove them and
85 make the space wider. We have the room to put all the booths in. They are hoping that the barriers between booths, which
86 are thick and you can't through them, will provide adequate distancing for everyone.
87

88 **Selectmen Dudziak made a motion to rescind the polling location at the Hampshire Hills Dome. Seconded by Se-**
89 **lectman Labonte. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte**
90 **yes, Selectman Freel yes and Chairman Daniels yes. The motion passed 5/0.**
91

92 **Selectmen Labonte made a motion to change the polling location to Milford High School on West Street. Seconded**
93 **by Selectman Freel. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman La-**
94 **bonte yes, Selectman Freel yes and Chairman Daniels yes. The motion passed 5/0.**
95

96 **6:00 p.m. – Labor Day Parade – Brendon Philbrick**

97 Brendon Philbrick and Jay Duffy came in to discuss the Labor Day Parade. He recognized the Labor Day committee in the
98 audience. There has been overwhelming support to have the event. The Police Department has been in full support. The
99 parade will take place this year.
100

101 Jay Duffy reiterated everything Brendon said. Bob Courage will be the Grand Marshall. The theme of the parade will be
102 "Fruits of our Labor". This is the 72nd year of the parade. They are thankful for the \$10,000 that the voters supported. For-
103 mer Fire Chiefs will also be included in the parades. This is something for people to look forward to.
104

105 Jay asked if he could speak about the lack of flags being put in the cemeteries in town. He has placed many flags that were
106 supplied by the town. He's been in touch with Troop 4 to help with placing the flags. All cemeteries are complete except for
107 West Street and Riverside cemetery. He doesn't know if they should remove the flags after Veterans Day and put them back
108 on Memorial Day, he feels they should be put up all year long and be replaced as needed. Jay said the graves can be main-
109 tained easily depending on where they put the flags. Very few graves have a flush tone so it isn't too much to move them.
110 He is mindful of the work that has to be put into it. He said Rick Riendeau, Public Works Director is in favor of it.
111

112 Administrator Shannon said we can see how it goes this winter. Jay said he recalled as a kid that flags were up all winter.
113 Other cemeteries keep flags up all winter. Chairman Daniels asked about snowplows burying the flags. Jay said there aren't
114 any issues that he can see with plowing burying the flags.
115

116 Selectman Labonte said there is a section on the town's website on cemeteries that addresses flags. Jay said the clause is
117 about ornaments and doesn't apply.
118

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

119 Rick Riendeau, Public Works Director said the Cemetery Trustees makes the rules for the cemeteries, Public Works just
120 maintains them. It would have to be finalized through the Cemetery Trustees. Jay asked the Boards permission to approach
121 the trustees. Chairman Daniels said he didn't need their permission.
122

123 **3. PUBLIC COMMENTS** – Selectman Labonte referenced an e-mail letter from Paul Bagley that spells out many things
124 about our communications center. One of the things was about preventative maintenance on radios which hasn't been done.
125 Chairman Daniels said there was a follow-up e-mail where Captain Frye said he had been in contact with a company to
126 come out and review the maintenance of all radios. Selectman Labonte asked if it's been done yet. Captain Frye said that 2-
127 Way Communications Service would be coming out in a couple of weeks. Selectman Labonte said he would forward Mr.
128 Bagley's e-mail.
129

130 Selectman Labonte referenced a letter from the Police Union about putting the town on notice. He referenced a letter from
131 Jay Wilson of the MACC Base Board of Governors, which had a lot of good things in it. He wanted to contact the Union
132 Representative due to inaccuracies in his e-mail. Some of the things were already addressed by Jay Wilson. Selectman La-
133 bonte asked what it meant to be put on notice from the Union.
134

135 Chairman Daniels' interpretation is that this is not something that should be on the back burner. It needs to be front and
136 center and we are already doing that as quickly as we can. Everyone knows that the public has to be involved in the final
137 decision. We have been doing our due diligence and moving forward.
138

139 Selectman Labonte said that Captain Frye stated that he didn't have a problem at a Board of Governors meeting as far as
140 seeing what they needed to fix now. Selectman Labonte said he doesn't feel they can wait until March and then implement
141 something 18 months after. He wants to direct our representative of MACC Base to bring back to the Director and say,
142 "what is there that the Director can come up with that would improve our services now to not leave our emergency services
143 with inadequate communications". He isn't saying to create a Band-Aid fix but there has to be something that is less than 18
144 to 24 months away.
145

146 Chairman Daniels said they will be talking about the Board's decision later tonight and we will talk about it then. Selectman
147 Labonte said he doesn't want to stop anything that is already in progress now. He is ready to do something tonight and vote
148 on it.
149

150 **4. DECISIONS –**
151 **CONSENT CALENDAR.**

- 152 1. Request for Approval of Application for 2020 Reimbursement to Towns and Cities in which Federal and State Forest
- 153 Land is Situated - \$127,300.
- 154 2. Request for Approval to NOT USE the PA-28 Form in 2021.
- 155 3. Request for Approval to submit Nomination to the New Hampshire Library Trustees Association for the Wadleigh Li-
- 156 brary for "Library of the Year".
157

158 Selectman Dargie asked that 4. a) 2 be removed from the consent calendar.
159 Selectman Dudziak made a motion to approve the consent calendar except for 4. a) 2). Seconded by Selectman Labonte. A
160 roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes,
161 and Chairman Daniels yes. All were in favor. The motion passed 5/0.
162

163 Selectman Dargie referenced the memo to 4. a) 2) having the wrong name on it. Chairman Daniels said it's already been
164 corrected.
165

166 Selectman Dargie made a motion to approve 4. a) 2). Seconded by Selectman Dudziak. A roll call vote was taken with Se-
167 lectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes, and Chairman Daniels yes. All
168 were in favor. The motion passed 5/0.
169

170 **b) OTHER DECISIONS.**

- 171 1. N/A
172

173 **5. TOWN STATUS REPORT – John Shannon**
174

175 a. Osgood Pond Update - Phase II of the Osgood Pond Dredging Project, as voted on by the citizens of Milford, is continu-
176 ing on schedule. The dredging is going well and good progress is being made weekly. The Town will continue to work with
177 the appropriate state partners to ensure the work is done following all appropriate state regulations and best practices.

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234

Selectman Labonte asked how many yards have been removed from Osgood Pond. Administrator Shannon said he doesn't want to guess and would get that number, they are about halfway through the project. Selectman Freel asked if they started moving the old spoils yet. Administrator Shannon said yes.

Selectman Labonte asked how many different locations are the spoils being hauled to. Administrator Shannon replied four. Selectman Labonte asked if there was an amendment to the contract. Administrator Shannon said there didn't need to be an amendment. Selectman Freel thought all spoils were going to Brox. Administrator Shannon said he had conversations with Lincoln and referenced e-mails that were sent.

Selectman Labonte read section 16 of the contract about no modifications being made unless signed in writing by both parties. He asked who authorized to bring the spoils anywhere other than the Brox property and how many yards did not end up at the Brox property that should have. Administrator Shannon said they were asked by the Board to reach out to see who else wanted the spoils. There was more discussion about the interpretation of the contract. Selectman Labonte asked if there was financial benefit brought to the town by hauling the spoils somewhere other than the Brox property. Administrator Shannon said no. Selectman Labonte said that wasn't acceptable.

Selectman Freel said we just went through this with the sales of the old spoils and that the new spoils should be worth just as much even though no one wants the new spoils as much as the old spoils.

Administrator Shannon said he spoke with Lincoln after Selectman Labonte brought this up the other day. Lincoln said they were not supposed to be bringing spoils anywhere else and he spoke to Mathewson again to remind them. Administrator Shannon read an e-mail sent by Lincoln outlining where the spoils needed to go and to use the alternative sites only as the Town site reaches capacity. Selectman Labonte asked how much spoils went elsewhere. Administrator Shannon said he would get that number.

Selectman Freel clarified that everything goes to Brox until they run out of room. Administrator Shannon said yes. They tested one of the other sites to see how far it was. Selectman Labonte said he assumed that 1,000 yards were brought somewhere else. Administrator Shannon repeated that he would get that number, he wasn't going to make up a number. Selectman Labonte said they were in violation of the contract. Administrator Shannon said he doesn't share his opinion. We were asked by this Board to find alternate sites to put the spoils despite us keeping everything which was not implied at the time. We spoke to the contractor again, once verbally and now in writing, to take everything to the Brox until it can't go there anymore. When we first started all of this, and it's been going on for a while, the contractor was in on the conversation about trying to find alternate places for the spoils. It wasn't an issue at the time, and then it became an issue. He knows that they are not in violation of the contract. Earlier this week when Selectman Labonte brought it to his attention, he spoke to Lincoln. Lincoln then sent them an e-mail. They were warned and if it's done again, then they will be in violation of the contract.

Selectman Labonte said it was left as, if they could find another place, we would find a way to be compensated which would allow us to have more money to go into the dredging. Originally when this was put in front of the voters, it was 44,000 yards and now we are ending up with 24,000 yards. He's been trying to get the taxpayer's money closer to what was approved. He's seen the trucks delivering to private places. He's brought it to the Town Administrator's attention a couple of times.

b. 2021 Budget - The Town's 2021 Budget preparation will begin in late July when the initial budget proposals are sent out to all necessary departments. A timeline for the entire budget process has been established. Please note that the timeline may be adjusted if needed.

c. Town Hall Re-opening Plan – The town hall will be opening back up tomorrow in a Phased approach. We will be open Tuesdays and Thursdays from 9:00 am until 1:00 pm for the next two weeks. You can go to the front of the Town Clerks office but not be able to go inside. Hand sanitizer and masks will be provided. We will expand our hours later.

Chairman Daniels said if the Town Clerks office is going to be open, is she still doing business by appointment or can people just drop in. Administrator Shannon said from 9:00am to 1:00pm on Tuesdays and Thursdays, it will be just like pre-COVID except for masks. All other hours, it will be by appointment like it's been during the pandemic. The drop boxes will continue to be utilized as well as going online and calling by phone.

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

235 Chairman Daniels asked what will be done if several people are waiting to see the Town Clerk. Administrator Shannon said
236 they are marking spots in the lobby, they can also cue up outside and we will use the BOS meeting room if needed. We will
237 adjust as needed. If someone is still in line by 1:00, they will not be sent away. We will finish the line.
238

239 **6. DISCUSSIONS:**

240 a. Position Statement of Milford Board of Selectmen (BOS) Regarding Dispatch – Chairman Daniels read the following:

241
242 In formulating its decision on the best dispatching option for the town of Milford, the Milford Board of Selectmen finds the
243 following:

- 244 • The study requested by voters at the 2019 Annual Meeting, and performed later in 2019 by CTA Consultants, LLC (CTA)
245 is the most comprehensive study Milford has received among the multiple studies done regarding emergency communica-
246 tions dispatching.
- 247 • As elected officials for the Town of Milford, we are obliged to put the interest of Milford first.
- 248 • The desire by the other member towns to be "equal partners" of MACC Base cannot co-exist while Milford pays 71% of
249 the operational cost.
- 250 • "Equal partners" would dictate that all member towns pay an equal proportion of the operational cost, and it is not fair to
251 ask the other member towns to subsidize Milford's share of the cost.
- 252 • "Equal partners" would also dictate that all member towns have an equal number of votes on the Board of Governors, and
253 it is not in Milford's best interest to relinquish any of its votes (financial or non-financial), as requested in the 2018 IMA
254 proposal presented and adopted as the position of the other member towns, as 29% of the Board of Governors would have
255 controlling interest over Milford's 71% share.
- 256 • Each member town should be responsible for its infrastructure. Milford has requested numerous times for member towns
257 to clarify if MACC Base is to be a system (to include responsibility for the communication towers) or a service, where each
258 town maintains its tower infrastructure, but we have not heard definitively on this definition. This matters greatly because
259 Milford would be responsible for 71% of the cost of resolving all dead spots for all emergency services in all existing and
260 future member towns if MACC deemed to be a system, and we currently have no idea what that cost would be.
- 261 • It is not in Milford's best interest to relinquish its borrowing authority and control to MACC Base. That authority should
262 be reserved for Milford voters, and the voters of other member towns if a partnership exists, not ceded to a third party.
- 263 • The proposal of a 10-year borrowing plan (as requested in the 2018 proposal offered by the other member towns is driven
264 by the necessity of the smaller towns to spread payment costs out over several years, but it also commits a town to contin-
265 ued payment of that loan if the town decides to discontinue membership in MACC Base.
- 266 • The space occupied by MACC Base is not compliant with today's safety code (NFPA 1221), but it is grandfathered be-
267 cause of the historical nature of the Milford Town Hall.
- 268 • Even though the existing MACC Base space is grandfathered from today's safety code, it is not in Milford's best interest
269 to install millions of dollars of new equipment in a non-compliant NFPA 1221 area that has a water sprinkler system, and
270 should there be a fire, risk losing our investment to water damage.
- 271 • The space occupied by MACC Base is not sufficient to withstand natural disasters such as earthquakes.
- 272 • It is not in Milford's best interest to agree to the proposed 2018 agreement supported by the other member towns that pre-
273 vent Milford from receiving its entitled share of any surplus that is supposed to be returned to us if Milford discontinues
274 MACC Base membership.
- 275 • By virtue of its non-compliance with NFPA 1221, MACC personnel face endangerment should an emergency (i.e. fire)
276 affect the currently occupied MACC Base space, leaving personnel to decide whether to evacuate or stay to control emer-
277 gency communication. This happens now when a fire alarm sounds at Town Hall. Everyone in Town Hall evacuates except
278 MACC personnel, who remain in the building to control communication.
- 279 • Not all issues with MACC Base are related to equipment. A 2018 audit of MACC Base identified material weaknesses in
280 accounting practices, segregation of duties, maintenance of capital asset records, and return of surplus to the towns, and
281 significant deficiencies in financial policies. The resolution of these deficiencies would require expansion of the MACC
282 Base organization and additional cost to the Member towns.

283
284 For the aforementioned reasons, supported by the 2019 CTA Report, the Milford Board of Selectmen finds it in the long-
285 term interest of the Town of Milford and its residents to make known its intent to pursue an alternate path for emergency
286 dispatching and discontinue its membership in MACC Base at a future time.
287

288 Selectman Labonte referenced 1221 compliant and said even CTA said they were going to build theirs as close to 1221
289 compliant as they can. He asked if Chairman Daniels was willing to say that we are going to build a "full" 1221 compliant
290 center. Chairman Daniels said he doesn't know what a full 1221 compliant building is but he is concerned about the endan-
291 germent of MACC Base personnel and the risk to millions of dollars' worth of equipment the water sprinklers go off.
292

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

293 Selectman Labonte said a lot of that can be addressed. If there were a three-alarm structure fire at the Police Department,
294 will they never have to leave the communication center and nothing will become affected due to the fire? Chairman Daniels
295 said he understands that a 1221 compliant structure is independent of anything around it and will continue to exist with
296 whatever happens. Selectman Labonte still questions that.

297
298 Cheryl Giggetts, CTA Consultant, said the study indicates that the building will be a separate specification than the radio
299 system so they will assist the architecture in building a structure to be as compliant as possible. The NFPA is a large docu-
300 ment that deals with many things. Chairman Daniels said document encompasses other things, not just communication cen-
301 ters.

302
303 Selectman Dargie asked if Chairman Daniels was looking for a motion on his position statement. Chairman Daniels said
304 yes after discussion and or changes to the statement were complete. Selectman Dargie said he wrote a similar document, a
305 little more detailed, but he supports Chairman Daniels document.

306
307 **Selectman Dargie made a motion to adopt the Position Statement of Milford Board of Selectmen (BOS) Regarding**
308 **the Dispatch document as presented by the Chair. Seconded by Selectman Dudziak.**

309
310 Selectman Labonte said he doesn't agree with the words "position statement of the "Milford Board", and would like to
311 change it to "the majority of the board" because he will not be voting for this.

312
313 **Selectman Dargie amended his motion and change it to "the majority of the Board of Selectman find". Seconded by**
314 **Selectman Dudziak. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman La-**
315 **bonte yes, Selectman Freel yes and Chairman Daniels yes. The motion passed 5/0.**

316
317 Selectman Labonte said people don't understand that MACC Base is an entity that deals with the dispatchers, and towers
318 but not the police radios. When you go with the \$2.4 million CTA plan, it includes all radios versus any discussion we've
319 had with MACC Base; they don't have anything to do with radios. He feels that we should put something in the statement
320 that we are only talking about service. He doesn't want the voters confused.

321
322 Chairman Daniels said people who have been following this already know, he knows that he's personally mentioned this at
323 least a half dozen times. He has made a system versus service very clear. We don't have a clear definition as to what other
324 towns are looking for from users when they have dead spots. Are they looking for us to pay 71% of the bill to put up towers
325 so that they can eliminate their dead spots? That is the blank check that he isn't willing to write.

326
327 Selectman Labonte said it's never been determined if the communication issue is due to the dispatch center or the end-user.
328 Selectman Freel said he thought CTA covered all of that. Selectman Labonte said they keep saying we have a weak signal
329 but he hasn't received any diagnostics from CTA about it. What have we done from a service standpoint? MACC Base has
330 its preventative service and its output is where it's supposed to be.

331
332 Chairman Daniels said despite all the things that we can't agree on with the member towns, he thinks that the one thing that
333 they did agree upon was that the equipment needs to be overhauled and brought up to date to last into the future. It doesn't
334 matter where it's going to be, the equipment has to be replaced, updated and protected.

335
336 Selectman Freel said in his opinion, if the technology is going to be updated, the towns should all pay equal shares. It
337 shouldn't be a 71/29 split. At the end of the day, all the towns can say that they have equal ownership of the equipment. It
338 doesn't matter where the dispatch center is, all three towns should have the same cost no matter what the size of the town.
339 The equipment serves a purpose and they all have a stake in that equipment. He hears all the time that the service on the day
340 to day, month to month, that Milford should have the 71% but if the equipment is benefiting all the towns, it should be 1/3
341 for each town.

342
343 Karen Blow, Milford resident, said that several Police Officers have left over the last few years and their concerns have
344 been around officer safety. Last week she heard that an officer on Capron Road couldn't hear what is being transmitted
345 through MACC Base and MACC Base is asking them to either go back to the vehicle or to call on their cell phone. If they
346 are trying to interact in a critical moment, they should not have to utilize another method of communicating with MACC
347 Base. She asked the Board to keep in mind the officer's safety. We have to do what is in the best interest of our officers.

348
349 Selectman Dudziak called the question. She said we are going around and around about the same thing every meeting.
350 Chairman Daniels said the motion failed for lack of a second.

351

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

352 Selectman Labonte said he agrees with Karen about officer safety. MACC Base was dispatching out and the portable radio
353 didn't pick it up, could it possibly be the equipment of the end-user. Our portables and radios are going to be checked out
354 through the service program, but how many years has it been that any of our radios been tested. A request in January
355 showed that no one could produce records.

356
357 Chairman Daniels said we would find out in a couple of weeks. Selectman Labonte said the possibility is there. We have
358 maintenance programs on everything else. In response to Selectman Feels comment about all towns paying 1/3 the cost,
359 you take a town like Mont Vernon who just installed a microwave system and they don't need any infrastructure so why
360 would they want to pay 1/3. Selectman Freel said they need the equipment at MACC Base to latch on to that. Selectman
361 Labonte said he's not disagreeing to a portion of that. Not everyone needs the same thing; one town may need more than
362 another. What happens if Milford needs the most?

363
364 Chairman Daniels said that his comment in the statement was that the other towns were using the term "equal partners". It's
365 equal when it comes to voting but not paying an equal cost. If it's one vote for each town, you could have 29% override the
366 71%.

367
368 Selectman Labonte said he doesn't believe that there's been a directive that's been given to our Board of Governor repre-
369 sentative for finding a possible solution or anything at MACC Base. He feels that this whole position thing should wait un-
370 til we know the status of our radios, and we should wait until we've given a directive to our BOG representative asking
371 them for a solution. Because the direction has never been given, he feels it's negligence on the Town of Milford's part.

372
373 Cheryl Giggetts, CTA Consultant she understands that the issue right now is whether or not the problems you're having are
374 with your infrastructure or with your subscriber unit. It has been her experience, over thirty years, that seldom is it the sub-
375 scriber unit. The units would have to be extremely old, or low-end units or not well cared for. We've seen that your sub-
376 scriber units are well cared for. The Police Department has purchased some of the newer units and they are behaving in the
377 same manner as the older units, which mean that they are not getting the signal. The infrastructure has to be replaced and
378 this is the same issue that all the towns are having. This isn't a repeated system, this is a system where we have placed some
379 mobile units on poles or towers and we are doing the best that we can to get that signal back and forth. The signal can only
380 go so far. The reason we use repeaters is that they allow the signal to travel much further and it gets repeated back from one
381 unit to another. She's been going through all of the incident reports for the past few months and we are seeing a great deal
382 of portable, it's not portable to portable so it isn't that talk around situation that was referenced several meetings ago, it's
383 actual portables getting into the system and that conversation being able to get into our dispatch center. This is an infra-
384 structure issue that has to be resolved for you to have reliable communications.

385
386 Karen Blow just wanted to ask in relation to what Selectman Labonte was saying, that MACC Base hasn't been asked for
387 this or for that. Why hasn't MACC Base been proactive in providing some of this information instead of waiting to be
388 asked? If they wanted to enhance the relationship wouldn't they pull together some of this information on their own accord
389 without having to be directed by the Board? They are listening and participating in all the meetings, she would think that
390 some of these things would be self-directed.

391
392 Selectman Labonte asked if we could ask our Board of Governors that question. He would like clarification from one of
393 Jason's bosses about why Jason isn't doing that. Karen said she wasn't putting this out there as another opportunity to delay
394 this process. She just feels that MACC Base has had ample time over the last few to provide some of this information. She
395 is very hopeful that what Chairman Daniels proposed and with what is being discussed, that we are going to start seeing
396 some resolution to this.

397
398 Jason Johnson, MACC Base Director, addressed Karen's concerns about MACC Base not being proactive; he said they
399 have been proactive which you can see if you look through the history. They offered a single site radio repeater in 2015 to
400 be expanded to one town per year and it was declined by the Town of Milford's voting. They also suggested that the Towns
401 use surplus funds from MACC Base to use for car repeaters that were already used successfully in Mont Vernon and
402 Lyndeborough. They also provided, in 2016 and 2017, a comprehensive plan for replacing all equipment for the Police,
403 Fire, EMS, and DPW transmit and receive sites, not subscriber units as in CTA's plan. In 2016 MACC Base spearheaded
404 Mont Vernon's microwave project and their grant. They have tried to address the issues. The problem is that they have been
405 blocked by two to two votes, with Milford against, on implementing these.

406
407 **Chairman Daniels made an amendment to the motion to also change the last paragraph where it says the Milford**
408 **Board of Selectmen to say "the majority of the Milford Board of Selectmen". Seconded by Selectman Dargie. A roll**
409 **call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes**
410 **and Chairman Daniels yes. The motion passed 5/0.**

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469

Selectman Labonte repeated that he still feels that we should wait as far as our position until we give direction to our Board of Governor representative to see what happens. He would like to know where he can get the information on what technical testing that CTA did on either MACC Base's equipment or the Town of Milford's equipment, or any other surrounding town's equipment where they can show analytical results other than "geesh, we feel it's good".

Selectman Dargie said in reply to Selectman Labonte, that we should move forward with this statement. We've had discussions with the other towns and we need to have our position known as to what we will be doing. It isn't clear to some people that we are planning to leave MACC Base and move forward with our system. We can have a separate discussion about what can be done in the short term to improve officer safety. Maybe we can maybe we can't. It's been stated that there is nothing economic to have any kind of substantial change in anything. That is a separate discussion in a parallel path with moving forward with the main path of upgrading the entire system and going on our own. He is in favor of this document.

Mike Viola, Milford Police Chief, clarified that Director Johnson was right that in 2015 they did offer Milford a standalone repeater/frequency but it wasn't voted down just by us, it was voted down by all the Police Chiefs that were involved. As for the portables that we use, these are the same portables that the other departments also use. Most of them were obtained with a grant and we've bought more since. He checked with the other Chiefs about their portables and they are all pretty much the same. He doesn't know how much upkeep they have had; he doesn't think it's been too much. One question brought up was, do we consult with MACC Base before we buy our portables. Milford doesn't, nor do any of the other departments.

Chairman Daniels noted that Selectman Dargie included a position paper that serves well as back up documentation to this position paper. The motion before us is to accept the position statement as amended. **A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte no, Selectman Freel yes and Chairman Daniels yes. The motion passed 4/1 with Selectman Labonte opposed.**

Selectman Labonte repeated what are we going to do and why have we not directed our Board of Governors representative to bring this to the Board of Governors and MACC Base to see what can be done. He is recommending that we give our representative a directive to get us out of our communication place that we are in right now.

Chairman Daniels asked Chief Viola and Captain Frye what their plan was to handle the situation that Selectman Labonte brought up knowing the time frame that you have.

Captain Frye said the portables are updated. As far as the MACC Base fix, as a Board of Governor, it should be in the best interest to create an RFP to go out and fix the system. We still don't have a number to build a system. CTA gave us a price that is close to it and they have been in business for 30 years. He believes that their \$4.9 million is what it would cost for a MACC Base fix. Other towns have told us we pay for what we get. If we want to pay again, our portion of it at 71%, we can ask the other town if they are willing to put out an RFP we can do it. We won't one source this project out to anyone but by the time we get around to doing that, it will be late 2021. It's going to take a while. We had our shot last year and we didn't have all the support from all of our Board. As far as repeaters, the other towns put them in their cars but they only have a couple of cars, not 18. He believes that once he gets the report from 2-Way, that says our equipment is fine, we will be able to move on.

Selectman Labonte asked if the \$4.9 million include all the subscriber radios for everyone for all the towns. Captain Frye said he didn't look at the \$4.9 million because that wasn't his concern; his concern was the town of Milford. Selectman Labonte said once you start dragging in MACC Base as a fix and you bring in all the subscriber units you are mixing apples and oranges again because you are mixing up the equipment versus town-owned equipment. Captain Frye said it's probably laid out in the CTA report.

Cheryl said the \$4.9 does include the subscribers for all of the stakeholders for all of the towns. The subscribers will need to be replaced so that they can communicate with the new infrastructure. You will not be able to use your existing older subscribers on this which is why we gave you an all-inclusive price which is why the second warrant article in March was adjusted. The proposed warrant article number 5 didn't include everything. You can't update infrastructure and not update the subscriber units.

Selectman Labonte said when you break up the 71% if you put the \$4.9 million into play; you can't break it up as Milford pays 71% because Milford is going to buy their assets as far as their radios and portables. The other towns are going to buy their own. You are mixing apples and oranges in those numbers. The subscriber units are covered 100% by the towns.

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

470 Captain Frye said not all the towns are going to need new equipment. Cheryl said the \$4.9 million was broken out by
471 towns. When we did that, we included the subscribers for each of the towns. Each town was responsible for its infrastruc-
472 ture and subscriber units. Once that is broken down, Milford's portion is roughly 58%. That in her opinion is apples to ap-
473 ples.

474
475 Selectman Labonte repeated that he wanted to put forward a directive to MACC Base. He asked Chief Viola if he was okay
476 not changing anything in his radios presuming in March a warrant article will pass and presuming 18 months after that it
477 will be instituted. Do your officers feel safe and secure the way we are at.

478
479 Chief Viola said he's been working on this since 2013 and trying to get things changed. He wants the change to be effective
480 and to last which is why they went this way to get it to be the best way to work. Our system isn't the best but we are work-
481 ing with what we have, but we want it to be better. We are also trying to be fiscally responsible and also do something
482 where we won't run into these problems another 10 years from now. We all would like a quick fix but we have to work
483 within the system that we have to get this done. We've done several studies and he thinks CTA's study is the most in-depth
484 one and giving us the best path to work with. He is confident that his officers are safe as they can be, but he is not confident
485 in the system. He is confident in what CTA is suggesting.

486
487 Administrator Shannon asked Cheryl that if the warrant article was voted on in March and approved, how long it would
488 take to get the system running since the RFP will already be in place and approved by the Board. Cheryl said after the ap-
489 proval, a little over 12 to 14 months. If it's a regional fix it will take 18 to 24 months.

490
491 Kevin Federico, Milford resident, said he's happy that the majority of the Board is making their position clear on their intent
492 to move forward. He's said multiple times that we've spent close to \$100,000 and had outside, third party, independent
493 companies come in and tell you that what is realistic and what isn't realistic. Some people want to hear it and some people
494 don't. Anything takes time. The Board needs to explain its position to the Milford taxpayers and move forward.

495
496 Selectman Labonte, in response to Cheryl's estimate of 12 to 14 months, it keeps getting shorter and shorter and even with
497 that, we will be in the middle of a contract with MACC Base. He repeated that the Union and officers do not feel safe. Do
498 we have to have an injury before we direct our Board of Governor to do something either on the MACC Base side or the
499 equipment side for Milford?

500
501 Selectman Dargie said as far as the timing, in the document that he put together assuming that the warrant article passes in
502 March, the system will be put together roughly September of 2022 which is longer than the 12 to 14 months but he padded
503 it a bit. He said we would go live in January of 2023. We would give notice to MACC Base in December of 2021 and leave
504 them at the end of 2022.

505
506 Bobby Jones, Milford Police Union representative, AFSME Council 93 said he wrote the letter previously mentioned, he
507 asked Selectman Labonte, as a sitting member of the Board, why he didn't give the direction that he is seeking before to-
508 night. Before Captain Frye, it was an actual Board member from this Board that was the representative for Milford on the
509 Board of Governors. That member voted on any issue brought forward because of officer safety.

510
511 Selectman Labonte said he's been a Board member since March 2019 as he has mentioned several times. This is a challeng-
512 ing Board to be on because after taking your oath you are given no directive; you are just thrown into the lion's den. He
513 didn't support the Milford Dispatch warrant article and still won't, nor will he encourage others to support it. He said he
514 cares about the officers and he has brought this up every meeting since the vote.

515
516 Bobby Jones said he is sorry if Selectman Labonte misunderstood but this appears to be the first time you are coming out
517 about giving direction or questioning why the member representing Milford on the Board of Governors wasn't doing more.
518 That is what he was inferring, not that you as an individual or as a member of the Board didn't take the officer's safety issue
519 seriously. Mr. Jones said tonight it appears abundantly clear to him that some personalities are getting in the way and he
520 feels that Selectman Labonte is going after Captain Frye about, "why didn't you do this or that". He didn't think that the
521 MACC Base Board of Governors was involved with the day to day operations of MACC Base where they gave specific
522 direction to the Director on a daily basis as other employers would. He thought they were there to work as the liaison be-
523 tween the subscribers to MACC Base and also to enforce the municipal agreement.

524
525 Selectman Labonte apologized for his comments for clarification to Captain Frye and the public. He has never once ques-
526 tioned whether Captain Frye was doing enough. He doesn't expect Captain Frye to do things on his own that is why he says
527 the Board. He is learning more as a Selectman every meeting, he can have a discussion all he wants but if he doesn't make a

DRAFT MINUTES OF BOARD OF SELECTMEN MEETING – 07/27/2020

528 motion, nothing happens. At least if he makes a motion and it gets voted down, he can say he tried. He is hoping this dis-
529 cussion will end up with a motion with a directive to start as a solution for the safety of our officers.
530

531 Bobby Jones said he agrees with Selectman Freel said earlier with, if you are going to replace the infrastructure alone, not
532 end-users, mobile radios or portable radios, it should be 33% for each town, not 71% for Milford. They are all using the
533 infrastructure at some point and it doesn't matter what percentage they are using.
534

535 Selectman Freel asked where we go if the warrant article doesn't pass in March. We have to do something to fix the prob-
536 lem. Let's vote one more time but we need a backup plan. Selectman Dudziak said we cross that bridge when we come to it.
537 We don't know what is going to happen in March. Selectman Freel hopes there is something that we can move forward on.
538

539 Selectman Dargie said he doesn't have a problem with giving a directive with the Board of Governors to investigate trying
540 to make improvements to the system but there should be limitations on that. CTA study said the real solution was to replace
541 the system. Maybe there is something that could be done in a shorter time for less money. We could make a motion that the
542 Board of Governors investigates what can be done to improve the officer's safety that could be implemented in one year and
543 cost less than \$700,000. That would be like a Band-Aid fix while we implement the actual fix.
544

545 Selectman Labonte said he was on the 2018 Budget Advisory Committee and he asked what plan B was for dispatch. He
546 said he wasn't given an answer on Plan B.
547

548 Selectman Labonte made a motion to give a directive to our Board of Governors representative to inquire as to what can be
549 done to help officer's safety and be implemented as soon as possible with no dollar amount put in and no matter what the
550 answer comes back to; it has to come back to this Board for approval. Seconded by Selectman Freel.
551

552 Selectman Dargie asked for an actual time limit on that instead of "as soon as possible". It needs to be done within a year.
553 He wants to avoid them going through a whole CTA study, maybe something on a smaller scale. He wouldn't want them to
554 do a full RFP to replace everything.
555

556 Chairman Daniels asked if Captain Frye understood the motion and what is expected. Captain Frye said yes. He asked what
557 would happen if Two-Way's report comes back and says that there isn't anything wrong with Milford's equipment. He
558 would think that you would want a couple of estimates with an RFP to fix the system. He feels they should wait for the
559 maintenance report on the equipment.
560

561 Selectman Labonte disagrees. If the report comes back with all the equipment is great, that is all the more reason to go back
562 to MACC Base and ask them what's up. Captain Frye said he doesn't think it would do just to have one source bidding
563 without doing a separate RFP without starting this whole process over again for the voters. Selectman Labonte said he was-
564 n't looking for one source price. Captain Frye agrees, Milford should look at a couple of different prices and that is with the
565 RFP for CTA is doing. That is the same path that is the right path that would be equal for everyone.
566

567 **Selectman Dudziak called the question. Seconded by Selectman Dargie. A roll call vote was taken with Selectman**
568 **Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes and Chairman Daniels yes. The**
569 **motion passed 5/0. The debate has ended.**
570

571 **Chairman Daniels said the motion on the floor is to direct our Board of Governors representative to bring to the**
572 **MACC Base Board of Governors a question on what can be done to improve officer safety.**
573

574 Administrator Shannon said for clarification, they want Captain Frye to go to the MACC Base Board of Governors to re-
575 quest them to look into possible solutions to fix communications issues with the Police officers and other first responders in
576 a shorter time frame than what we currently have. Chairman Daniels said yes.
577

578 **A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak no, Selectman Labonte yes, Selectman**
579 **Freel yes and Chairman Daniels yes. The motion passed 4/1 with Selectman Dudziak opposed.**
580

581 **7. PUBLIC COMMENTS:** Kevin Federico said he likes to make it clear that no money is going to be spent on what he
582 calls a "third study" for the same question, the first at \$30,000 the second at \$85,000, he doesn't need to have his tax money
583 pay for a third study, so he would like us to not pay for anything that you just asked for MACC Base to produce.
584

585 Chairman Daniels said that was clarified in the making of the motion that there was to be no money involved.
586

587 **8. SELECTMEN'S REPORTS/DISCUSSIONS.**

588

589 Selectman Labonte said Granite Town Media is up and running for hybrid meetings. He is asking if anyone watching today
590 to let them know what can be done differently.

591

592 **a. FROM PROJECTS, SPECIAL BOARDS, COMMISSIONS & COMMITTEES.**

593

594 **b. OTHER ITEMS (that are not on the agenda).**

595

596 **9. APPROVAL OF FINAL MINUTES.**

597

598 Selectman Labonte asked if they could get the minutes earlier instead of by Friday. He couldn't get to them this past week-
599 end because he was busy. The amendments came out over the weekend but he didn't get them until today. He understands
600 that the majority of amendments are grammatical but he feels that he has to go through and see if it changes the meaning of
601 the sentence.

602

603 Tina Philbrick said she can't do them any faster than she's doing them now. Selectman Labonte said they were minutes from
604 the last meeting; he just got them on Friday which is 10 or 12 days after the last meeting. Tina repeated that she is doing
605 them as fast as she can, then they have to be reviewed by the Town Administrator. If she can get them out sooner she will,
606 but right now she is doing the best that she can.

607

608 **Selectman Dargie moved to approve the minutes of the June 29, 2020 (work session) and July 13, 2020, as amended.**
609 **Seconded by Selectman Dudziak. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Se-**
610 **lectman Labonte abstained for lack of time to review, Selectman Freel yes, and Chairman Daniels yes. All were in**
611 **favor. The motion passed 4/0/1. With Selectman Labonte abstaining.**

612

613 **10. INFORMATION ITEMS REQUIRING NO DECISIONS.**

614

615 **11. NOTICES.** Notices were read.

616

617 **12. NON-PUBLIC SESSION.** Selectman Dargie made a motion to go into non-public in accordance with (RSA 91-A: 3, II
618 (a)) – Personnel, and approval of Non-public minutes (RSA 91-A: 3, II (a)) – Personnel from July 13, 2020. Seconded by
619 Selectman Labonte. A roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes,
620 Selectman Freel yes and Chairman Daniels yes. The motion passed 5/0

621

622 **3. ADJOURNMENT:** Selectman Dargie moved to adjourn at 8:20. Seconded by Selectman Freel. All were in favor. A
623 roll call vote was taken with Selectman Dargie yes, Selectman Dudziak yes, Selectman Labonte yes, Selectman Freel yes,
624 and Chairman Daniels yes. All were in favor. The motion passed 5/0.

625

626

627

628

629

630 _____
Gary Daniels, Chairman

631

632

633

634 _____
Paul Dargie, Vice Chairman

635

636

637

638 _____
Laura Dudziak, Member

Chris Labonte, Member

David Freel, Member

10. a) Treasurer's Report - June 2020

TREASURER'S REPORT
TOWN OF MILFORD, NEW HAMPSHIRE
6/30/2020
(unaudited)

	CHECKING ACCOUNT	TOWN CLERK ACCOUNT	ESCROW ACCOUNT	NHPDIP ACCOUNT	DISBURSEMENT ACCOUNT	BAR HARBOR ACCOUNTS	INVESTMENT ACCOUNT	TOTAL
Beginning Balance as 6/1/20	1,057,013.15	42,344.05	135,094.30	4,500,806.14	16,998.30	10,673.70	256,553.91	\$ 6,019,483.55
Receipts:								
Taxes and Interest	16,916,392.06	-	-	-	322,334.14	-	-	\$ 17,238,726.20
Water & Sewer User Fees	333,207.26	-	-	-	33,502.43	-	-	\$ 366,709.69
Other Revenues	237,439.10	423,020.44	-	-	-	-	-	\$ 660,459.54
Ambulance	-	-	-	-	70,699.11	-	-	\$ 70,699.11
Recreation	-	-	-	-	465.00	-	-	\$ 465.00
Escrow Deposit	-	-	-	-	-	-	-	\$ -
Escrow Transfers	-	-	-	-	-	-	-	\$ -
Interest Income	-	-	27.68	3,946.82	-	0.43	118.68	\$ 4,093.61
Investment Transfers	2,831,000.00	-	-	11,695,000.00	-	-	4,817,000.00	\$ 19,343,000.00
TAN Deposit	-	-	-	-	-	-	-	\$ -
Bond Proceeds	-	-	-	-	-	-	-	\$ -
Total Receipts:	<u>\$ 20,318,038.42</u>	<u>\$ 423,020.44</u>	<u>\$ 27.68</u>	<u>\$ 11,698,946.82</u>	<u>\$ 427,000.68</u>	<u>\$ 0.43</u>	<u>\$ 4,817,118.68</u>	<u>\$ 37,684,153.15</u>
Disbursements:								
Accounts Payable Warrants	(1,273,833.94)	(112,586.58)	-	-	(13,515.13)	-	-	\$ (1,399,935.65)
Payroll Warrants	(497,831.88)	-	-	-	-	-	-	\$ (497,831.88)
Milford School District Appropriation	(4,117,096.00)	-	-	-	-	-	-	\$ (4,117,096.00)
Hillsborough County Appropriation	-	-	-	-	-	-	-	\$ -
Escrow Transfers	-	-	-	-	-	-	-	\$ -
Investment Transfers	(14,772,000.00)	(346,000.00)	-	(1,940,000.00)	(448,000.00)	-	(1,837,000.00)	\$ (19,343,000.00)
TAN Disbursement	-	-	-	-	-	-	-	\$ -
Suntrust Disbursement	-	-	-	-	-	-	-	\$ -
Bank Charges	(1,345.87)	-	-	-	-	-	-	\$ (1,345.87)
Voided Checks	5,500.28	-	-	-	-	-	-	\$ 5,500.28
Total Disbursements:	<u>\$ (20,656,607.41)</u>	<u>\$ (458,586.58)</u>	<u>\$ -</u>	<u>\$ (1,940,000.00)</u>	<u>\$ (461,515.13)</u>	<u>\$ -</u>	<u>\$ (1,837,000.00)</u>	<u>\$ (25,353,709.12)</u>
Ending Balance as of 6/30/20	<u>\$ 718,444.16</u>	<u>\$ 6,777.91</u>	<u>\$ 135,121.98</u>	<u>\$ 14,259,752.96</u>	<u>\$ (17,516.15)</u>	<u>\$ 10,674.13</u>	<u>\$ 3,236,672.59</u>	<u>\$ 18,349,927.58</u>


 ALLEN WHITE
 TOWN TREASURER

July 30, 2020