City of Lewiston

27 Pine Street
Lewiston, Maine 04240

City of Auburn

60 Court Street
Auburn, Maine 04210

JOINT LEWISTON & AUBURN CITY COUNCIL WORKSHOP
MONDAY, NOVEMBER 28, 2016
6:00 PM
AUBURN HALL
COUNCIL CHAMBERS

1. Lewiston-Auburn 9.1.1 Update

City Council
Information Sheet

City of Auburn

Council Workshop or Meeting Date: 11/28/2016

Author: Denis D'Auteuil

Subject: Lewiston-Auburn 911 Update

Information: The Interim 911 Director will present updates on the LA 911 FY18 Capital Improvement Program, interim staffing changes, and the recommended approach to managing the agencies fund balance.

Advantages:

- Proposed capital projects address communication issues.
- FY18 Capital Improvement Plan provides a clear picture of immediate and future needs.
- Provides clear direction on the management of fund balances for the LA 911 operations.

Disadvantages:

- The current communication system is outdated and exposes Public Safety operations in both cities to potential problems.
- The fund balance approach was questioned during the FY17 budget process. Staff needs to provide clear direction to the 911 committee on the management of future fund balances.

City Budgetary Impacts: See proposed FY18 Capital Improvement Projects attached.

Staff Recommended Action: Approve fund balance approach and FY18 CIP request

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Previous Meetings and History:

- Joint Lewiston-Auburn City Council workshop on Lewiston-Auburn 911

Attachments:

1. Memo from Interim Director on LA 911 update - 11/16/2016
2. Unaudited Fund Balance as of 6/30/2016
3. FY18 Capital Improvement Projects request

Lewiston Fire Department

Paul M. LeClair
Fire Chief

Bruce H. McKay
Assistant Chief

November 16, 2016

Edward A. Barrett, Lewiston City Administrator
Denis D'Auteuil, Auburn City Manager

RE: Update from the Interim Director

Ed & Denis,

Effective November 4, 2016, Director Phyllis Gamache resigned her position with LA911. The transition has gone well and, through interim assignments, all essential job duties will be completed. As part of my interim director assignment, I will meet with the administrative staff on Monday and Thursday each week to review budget, operational, and personnel matters.

Interim LA 911 Staffing

At the October 2016 LA911 Committee meeting, the committee approved the following **interim** personnel assignments:

- Lewiston Fire Chief Paul LeClair appointed Interim 911 Director.
- LA911 Day Shift Supervisor, Tim Hall, appointed Interim Operations Manager.
- LA911's IT Director, Drew McKinley, is assisting the operations manager with day to day matters.
- Katie Gallant was hired as the full time LA911 Clerk. Katie was also appointed Interim Office Manager.

Prior to her departure, Director Gamache had advocated creating a Deputy 911 Director position outside of the budget cycle. The Committee determined such action should follow the budget process and be presented to both City Managers and Councils as part of the FY18 LA911Budget proposal. The interim positions will maintain continuity of operations until a replacement director is hired. The hiring process was initiated in early November.

LA911 Fund Balance as of 06-30-2106 (unaudited)

I have attached a copy of the LA911 Financial Statement as of 06-30-2016. The LA911 Committee Treasurer, Heather Hunter, has reported the FY16 year end fund-balance with the following offsets:

Beginning Fund Balance:	$419,570.37
FY 15 Surplus:	$99,949.72
Ending Fund Balance:	**$519,520.09**
LESS:	
Reserve for Encumbrances:	$63,703.31
Reserve for Compensated Absences:	$63,050.31
Fund Balance Carryforward for FY17's Budget:	$65,281.00
Total Unassigned Fund Balance:	$327,485.47

Approach to Unassigned Fund Balance

At the joint Council meeting in June, there was considerable discussion of the approach the cities should take to LA 911's unassigned fund balance. At that time, Lewiston Finance Director, Heather Hunter, proposed that a fund balance target of 10% of budget be adopted, recognizing that potential equipment failures could easily require immediate action by the 911 Committee to address public safety needs. Management staffs of Auburn and Lewiston appear to also support this recommendation.

At the present time, unassigned fund balance is 15.3% of the agency's operating budget, a surplus of $113,661 above the 10% level.

Potential use of fund balance should be considered by both Cities at the time that they review the agency's operating and capital budgets, and a preference should be given to using any excess funds to offset the anticipated substantial capital costs addressed elsewhere in this memo.

Webber Avenue Tower site Filtering Solution

Public safety frequencies (Police, Fire, and Public Works) in Lewiston have suffered from interfering interactions between all the transmitters and receivers located at the Webber Street tower. A filtering solution to address this problem was developed by Motorola Radio Engineers. Given the potential hazard this issue posed for public safety personnel, the Lewiston City Administrator and the Auburn City Manager supported the position of the 911 Committee that this situation should be immediately addressed. The new filtering equipment was installed by LA911's primary repair resource, Dirigo Wireless Inc. The total cost of the project was $31,838.80 and was funded from LA911's Fund Balance. This project amount is accounted for in the "Reserve for Encumbrances" above.

Microwave Link

The redundant microwave link project being evaluated as a potential solution to infrequent radio frequency drops affecting Auburn's emergency communications is currently not recommended as the number #1 priority for action to address radio communications deficiencies. The project will be included as part of the LA911 FY18 Capital Improvement plan and the project priorities will be defined along with other recommendations. Initially the microwave link project placed equipment on the Auburn Hall roof. Installing a radio antenna tower at the Goff Hill site addresses a more immediate need. Once the Goff Hill tower is in place a microwave link can be established between the Goff Hill tower, the Webber Ave tower in Lewiston and the Gracelawn tower in Auburn. There may be some offsetting savings when and if land lines are no longer needed.

FY18 LA911 Capital Projects

Our IT Director, Drew McKinley, and I have prepared a capital improvement plan proposal for the LA911 Committee to review at our November meeting. Recognizing the significant costs associated with needed upgrades and improvements, this plan is designed to be phased in over three to four years.

I. LA911's Radio Project has four major components:
   1. Improvements needed for the radio receiver/transmitter sites for Lewiston and Auburn to ensure adequate public safety communication coverage.
   2. Replacing Communication Equipment Consoles at the LA911 Center recognizing the age and condition of the current consoles.
   3. Replacing and Upgrading Fixed Radio equipment at the Center and Tower sites, again due to age and condition.
   4. Determine cost associated with the implementation of a dual band radio system. VHF Frequency System for Fire and 800 MHZ Digital System for Police.

II. The capital request for the LA911 Virtual Server Project can be funded over two years, FY18 & FY19. The FY18 Capital Funding request for the virtual server project will provide for the replacement of the main servers located at the 911 Center. The FY19 Capital Funding request will provide for the replacement of the DR (Disaster Recovery) servers located at Auburn Hall.

Please see the additional attached information providing greater detail on capital needs and programming.

Please let me know if I can provide additional information.

Sincerely,

Chief Paul M. LeClair

911 Committee
Financial Statements
06/30/2016 - unaudited

ORG	OBJ	ACCOUNT DESCRIPTION	ORIGINAL APPROP	REVISED BUDGET	YTD ACTUAL	ENCUMBRANCES	AVAILABLE BUDGET
[illegible]	337100	TF LEWAUB	(2,138,244.00)	(2,138,244.00)	(2,138,244.00)	-	-
9111	361100	INTEREST	(500.00)	(500.00)	(1,706.63)	-	(1,206.63)
9111	362900	RENT	(6,118.00)	(6,118.00)	(6,118.20)	-	0.20
9111	373311	CONTRIB	(56,713.00)	(56,713.00)	(56,782.96)	-	69.96
Total Revenues			**(2,201,575.00)**	**(2,201,575.00)**	**(2,202,851.79)**	**-**	**(1,136.47)**
9111	411000	REG WAGES	1,117,011.00	1,117,011.00	1,024,248.10	-	92,762.90
9111	412000	OVERTIME	173,275.00	173,275.00	245,424.42	-	(72,149.42)
9111	417001	MPERS ER	53,402.00	53,402.00	67,447.89	-	(14,045.89)
9111	417002	D COMP ER	25,601.00	25,601.00	16,155.34	-	9,445.66
9111	417003	FICA ER	98,707.00	98,707.00	102,204.54	-	(3,497.54)
9111	417100	HEALTH	365,674.00	365,674.00	272,601.31	-	93,072.69
9111	417200	FSA ER	18,200.00	18,200.00	14,153.14	-	4,046.86
9111	417250	HRA ER	-	-	458.60	-	(458.60)
9111	417400	W COMP	8,633.00	8,633.00	9,471.25	-	(838.25)
9111	417500	UNEMPLOY	5,696.00	5,696.00	2,796.94	-	2,899.06
9111	420500	PRINTING	125.00	125.00	-	-	125.00
9111	421500	POSTAGE	200.00	200.00	91.34	-	108.66
9111	422000	TELEPHONE	75,839.00	75,839.00	68,242.94	-	7,596.06
9111	422500	UTILITIES	27,957.00	27,957.00	21,736.08	-	6,220.92
9111	423000	TRAVEL	3,500.00	3,500.00	6,630.36	-	(3,130.36)
9111	425500	MED SERV	414.00	414.00	1,340.00	-	(926.00)
9111	426200	MAINT LIC	88,428.00	99,228.00	81,729.38	1,070.00	16,428.62
9111	427500	REP BLDG	12,600.00	28,600.00	30,304.76	16,860.00	(18,564.76)
9111	428000	LEGAL FEES	3,500.00	3,500.00	525.00	-	2,975.00
[illegible]	428800	MISC SERV	5,400.00	5,400.00	2,344.34	-	3,055.66
[illegible]	428900	INSERV TRN	9,119.00	9,119.00	5,902.00	-	3,217.00
9111	430500	OF SUPPLY	2,000.00	2,000.00	2,046.23	-	(46.23)
9111	431000	PRINTING	1,000.00	1,000.00	657.96	-	342.04
9111	439800	OTH SUPPLY	2,340.00	2,340.00	1,626.78	-	713.22
9111	442000	DUES	3,589.00	3,589.00	4,164.00	-	(575.00)
9111	446000	INSURANCES	20,804.00	20,804.00	18,456.21	-	2,347.79
9111	449001	PRINCIPAL	51,500.00	51,500.00	52,300.00	-	(800.00)
9111	449002	INTEREST	3,052.00	3,052.00	2,813.39	-	238.61
9111	449008	LEASE PYMT	10,734.00	10,734.00	10,734.00	-	-
9111	450500	OFF EQUIP	4,630.00	11,505.00	6,579.27	2,740.00	2,185.73
9111	452800	COMM EQUIP	26,320.00	41,320.00	29,716.50	43,033.31	(31,429.81)
Total Expenditures			2,219,250.00	2,267,925.00	2,102,902.07	63,703.31	101,319.62
		Surplus			99,949.72		
		Beg. Fund Balance			419,570.37		
		Ending Fund Balance			**519,520.09**		
		Reserve for Enc.			63,703.31		
		Reserve for Comp. Absences			63,050.31		
		Fund Balance Carryforward for FY17's budget			65,281.00		
		Unassigned Fund Balance			327,485.47		
		Total Fund Balance			**519,520.09**		

November 16, 2016

Capital Improvement Plan: Radio Replacement Project

Background:

The following LA911 Radio System Project recommendations were drawn from the TUSA Consulting report and consults with LA911 Radio Service Vendor, Dirigo Wireless. The recommendations are prioritized and listed as Phase 1 - 2 - 3 with proposed funding in FY18 through FY21.

The TUSA study recommended addressing the radio improvement project in steps.

- **Step 1**: Address Current VHF Radio Coverage Issues
- **Step 2**: Replace Radio Dispatch Equipment
- **Step 3**: Create an RFP for desired Radio system

Dirigo Wireless assisted with the capital project development by providing a 2nd opinion on priority of improvements and the development of associated cost.

The proposed **Phase 1 & 2** Capital plan (defined below) for LA911's Radio System mirrors the TUSA recommendations of **Step 1** & **2** and the requested funding is spread over the next two fiscal years (**FY18 and FY19**).

Prior to funding **Step 3** of the TUSA recommendation, a cost estimate to develop an upgraded radio system would be established during **Phase 2** as part of the **FY19 Capital** funding request, or sooner if authorized by the LA911 Committee. Based on cost estimates and the actual implementation date of an upgraded radio system, replacement of some or all of the VHF equipment for the Police & Fire Departments may occur due to age and lack of vendor support.

Projects are listed in **Order of Priority** for both the Radio Tower Site Improvements and the Replacement of Fixed Equipment for Phase 1 & 2:

Phase 1: FY18

1.	Goff Hill Tower Replacement	$675,000
2.	Fiber Connectivity associated with the Goff Hill Tower Project	$30,000
3.	Remote Receiver site in East Lewiston	$225,000
4.	Webber Ave (Lewiston) Building replacement: Radio and PC Equipment	$ 75,000
5.	Montello St. (Lewiston) Building replacement: Radio and PC Equipment	$65,000
	Total:	$1,070,000

Notes for Phase 1:

- Goff Hill Tower replacement cost would include: A 180' Tower, Shelter, concrete pad (normal soil conditions), Antennas, Antenna cables, installation of Antennas, Generator, Grounding, Equipment move from GraceLawn (L/A911 equipment), equipment move from Lewiston City Hall to Gracelawn (Auburn equipment), Filtering system (similar to Webber Ave.), and installation. Equipment move from Lewiston City Hall to Goff Hill site (Lewiston equipment).
- Fiber connectivity project is from Goff Hill Tower to LA911.
- Webber Ave & Montello Building replacement would improve current protections and conditions for the radio and pc equipment housed on site.

Phase 2: FY19

6.	LA911 Comm. Center Consoles (Eight Full Function Positions)	$592,000
7.	Fixed Equipment: Base Radios, transmitters, receivers and repeaters VHF	$300,000
8.	Microwave system: Webber to Goff, Gracelawn to Goff	$100,000
9.	Develop technical specifications and operational requirements for an upgraded radio system along with price quotes.	$30,000
	Total:	$1,022,000

Notes on Phase 2

- Quote on Consoles from Motorola provides for eight (8) fully functional dispatch stations.
- Quote on fixed equipment from Motorola pending. Some fixed equipment replacement may be required prior to Phase 3 radio system implementation due to the current age of VHF equipment.
- Quote on Microwave system from Dirigo will need to be finalized.
- Technical and operational quotes should be evaluated for cost comparison of maintaining VHF or improving to 800 MHZ.

Phase 3: FY20 & FY21

- Implementation of an upgraded radio system. Cost to be determined by Phase 2 recommendations and price quotes.

Notes on Phase 3

LA911's fixed equipment (radios and dispatch consoles) are supported by service warranty coverage through December 31 of 2018.

Options for an upgraded Radio System would include maintaining a VHF platform for the Lewiston and Auburn Fire Departments. The Lewiston and Auburn Police Departments would operate on the digital 800MHZ platform. Or both police and fire would operate on the same platform.

FY 2018 Lewiston Capital Improvement Program
Project Description Form

Project Title: **LA911 Virtualization Hardware Refresh FY18**

Operational Funding Division:	LA911	**Project Name:**	FY18 SAN Server Refresh
Est. Total Cost FY 2018:	143,000	**Est. Total Cost FY 2018-2022:**	280,000
City Share FY 2018:	71,500	**City Share FY 2017-2021:**	140,000

Project Description:
Planned hardware refresh interval for the LA911 Virtualization System. Hardware that is due to be replaced because of end of life (EOL) situations or replaced due to age of equipment and manufacture support limitations. The Storage Area Networks (SAN), Network Switches, and Servers that house the Virtualized datacenter of LA911 are due to be replaced. This project includes both the replacement of production site hardware and Disaster Recovery (DR) site hardware with reuse of current equipment as available.

Consistency with the Comprehensive or Strategic Plans or other related planning documents:
Organizations should proactively develop strategies that leverage resources, anticipate future requirements, and focus on business goals and performance objectives. As technology and other computing platforms become central to supporting the mission of the organization, effective planning for the management of these platforms has become vital. Per City of Lewiston Strategic Plan: Invest in solutions where appropriate in order to utilize assets more effectively and efficiently.

Justification for project implementation/construction and segments, if applicable:
Without staying current with supported hardware and emerging technologies, Systems become outdated, obsolete, and lose residual value. There is a high factor of risk involved in falling behind in a Datacenter hardware lifecycle management. Potential issues are extended system downtime, data loss, and data corruption.

Future maintenance costs if known, including contracts and special service requirements:
All hardware purchased will have 3yr coverage with maintenance costs for years 4 and 5. Estimated cost for yrs 4 & 5 are based on currently known figures on currently used hardware. Yearly estimate (yrs 4 & 5) are $8000 per year.

How were cost estimates obtained and expenditure commitment:
Worked with vendor to asses current usage and needs with planned growth and data trends.

FUNDING SOURCES

Source	Amount				
City Operating Budget	0				
City Bond Issue	71,500				
Federal/State Funding		**Agency:**		**Approval Received?**	Yes No
Other Agency/Municipality	71,500	**Agency:**	Auburn	**Approval Received?**	Yes **No**
Total Project Costs	**143,000**				

IMPLEMENTATION SCHEDULE (Fiscal Years)

	2018	2019	2020	2021	2022	Future
Total Project Cost	143,000	137,000				
Non-City Share	71,500	68,500				
City Share	71,500	68,500	0	0	0	0

Attach on separate page(s)/sheet additional information (if needed)

FY 2018 Lewiston Capital Improvement Program
Project Description Form

Project Title: **Radio Replacement Project**

Operational Funding Division: LA911 **Project Name:** Radio Replacement

Est. Total Cost FY 2018:	1,070,000	**Est. Total Cost FY 2018-2022:**	5,000,000
City Share FY 2018:	535,000	**City Share FY 2017-2021:**	2,500,000

Project Description:
Existing radio infrastructure is in year 21 of 15-20 year life cycle. Replacement parts are no longer made and are difficult to locate. Dispatch console parts are currently being purchaed on eBay. New system expands technology capabilities to meet current day and future demands and FCC requirements. Phase 1 build out includes a new transmit/receive tower on Goff Hill ($675,000), Remote receiver site in East Lewiston ($225,000), a new building for the Webber Street tower site ($75,000) and a new building at the Montello tower site ($65,000), Fiber connectivity for the Goff Tower project ($30,000).

Consistency with the Comprehensive or Strategic Plans or other related planning documents:
Replacement of the existing radio infrastructure, which links all of the cities' public safety law enforcement and fire responders, as well as partnering police and fire mutual aid agencies, will ensure the basic communication system of mobile and portable radios will continue to operate reliably and safety, serving both the responders and the communities. Working with partners in public works and the Aub-Lew airport to ensure communication compatibility.

Justification for project implementation/construction and segments, if applicable:
The radio network is failing in signal saturation (dead spots) and increased repair time. Motorola stopped making replacement parts. We are experiencing an increase in failed power supplies, which cannot be replaced and must be repaired, and creates a 'rob Peter to pay Paul' situation. Replacement parts for dispatch consoles being procured viae eBay.

Future maintenance costs if known, including contracts and special service requirements:
Unknown at this time. A radio consultant (funded via grant money)was hired to help guide the process to ensure the Center purchases equipment that meets current and future needs, does not over build for our needs and does not under build for premature obsolescence. His report agrees replacement is overdue and recommends multiple approaches to the process.

How were cost estimates obtained and expenditure commitment:
Estimates are still being collected.

FUNDING SOURCES

Source	Amount				
City Operating Budget	0				
City Bond Issue	535,000				
Federal/State Funding		**Agency:**		**Approval Received?**	Yes No
Other Agency/Municipality	535,000	**Agency:**	Auburn	**Approval Received?**	Yes **No**
Total Project Costs	**1,070,000**				

IMPLEMENTATION SCHEDULE (Fiscal Years)

	2018	2019	2020	2021	2022	Future
Total Project Cost	1,070,000	1,022,000	3,000,000			
Non-City Share	535,000	511,000	1,500,000			
City Share	535,000	511,000	1,500,000	0	0	0

Attach on separate page(s)/sheet additional information (if needed)

LEWISTON-AUBURN 9-1-1 EMERGENCY COMMUNICATIONS SYSTEM

VHF RADIO SYSTEM ASSESSMENT REPORT & RECOMMENDATIONS

tusa | Consulting Services

Raising the Bar in Radio Communications

INDEX

INTRODUCTION 2

Phase I Tasks

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INTRODUCTION

The cities of Lewiston and Auburn, Maine, cover a combined geographic area of approximately 100 square miles. The combined population consists of approximately 96,000 residents. Both cities are served by a single Public Safety Answering Point (PSAP) which accepts all wireline and wireless 9-1-1 calls for the area. The PSAP dispatches fire, police and EMS services. Each city has its own police and fire department.

Tusa Consulting Services (TCS) has been retained by the Lewiston-Auburn Emergency 9-1-1 Communications System (Lewiston-Auburn) to provide consulting services related to the existing VHF radio infrastructure that is used to communicate with all public safety departments in the Lewiston-Auburn area.

The project and scope of services includes two Phases:

Phase I

- assessment of existing capabilities and infrastructure
- system coverage study
- phased implementation of new equipment and capabilities

Phase II

- guidance in the preparation of a request for proposal (RFP) to solicit bids for an upgraded communications network
- analysis of proposals received via the RFP process
- identification of the most compliant proposal
- vendor award recommendation

➢ *The following report addresses the tasks described in Phase 1.*

1.0 ASSESSMENT OF EXISTING CAPABILITIES AND INFRASTRUCTURE

Current VHF Radio Systems

The Lewiston-Auburn VHF radio systems currently utilize two (2) main transmit (repeater) sites, one for each city, and four (4) voted remote receive-only (RX) sites, two of which are shared by both cities. The remote receivers for each city are monitored by an ASTROTAC signal-quality comparator at the PSAP. The comparator assesses the signal quality coming in from each receiver and selects the best signal to be passed on to Dispatch and to be repeated through the repeater's transmitter. Voting receiver systems are used to enhance portable radio "talk-back" coverage.

Primary radio system operational assignments:

Auburn Police Dispatch*	Lewiston Police Dispatch*
Auburn Police TAC*	Lewiston Police TAC*
Auburn Fire Dispatch	Lewiston Fire Dispatch
Auburn Fire TAC	Lewiston Fire TAC

*The Auburn and Lewiston police departments operate in Motorola ASTRO Digital mode. It is reported that ASTRO Digital was adopted as a means to discourage "listening in" to police communications with a scanner.

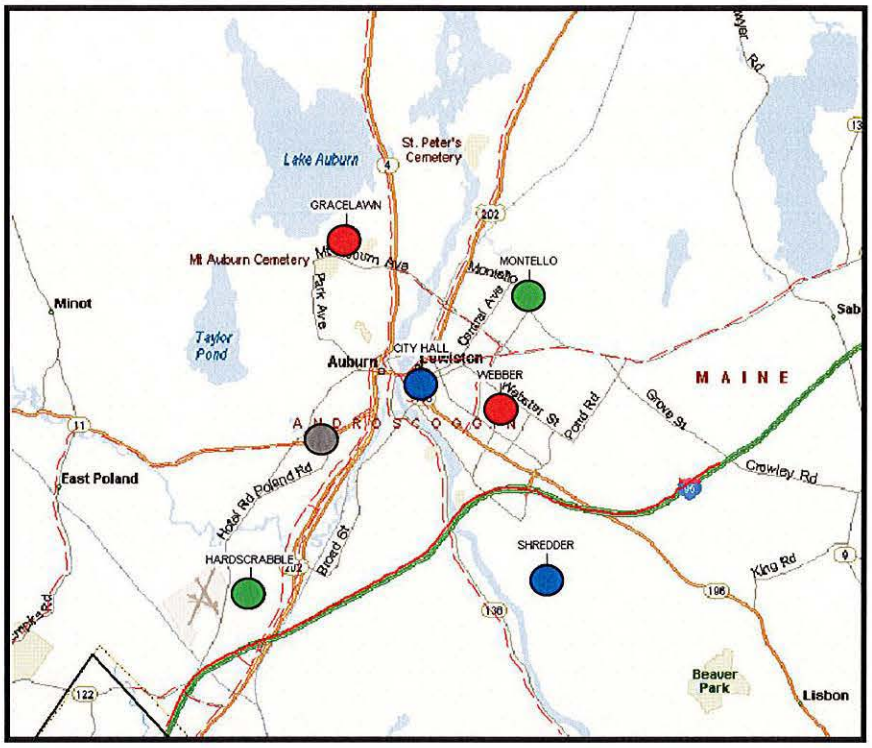
Other radio assignments/users within Lewiston-Auburn:

Publics Works
Schools
County Fire
Sheriff's Office

Equipment (all Motorola) used by Lewiston-Auburn includes: CentraCom Gold Elite radio dispatch consoles, APX Consolettes, XTS2500, XTS3000, APX6000li, XTL5000, XTL2500, Astro W4, Astro SPECTRA mobiles and portables, AstroTac remote receivers, Digitac comparators, and QUANTAR repeaters. Aside from the APX6000li portable radios, the balance of the equipment is approaching, or has reached, its end-of-service life.

A total of 185 radios (100 mobile - 70 portable - 15 console radios) are in use by the Lewiston-Auburn public safety agencies.

The Lewiston-Auburn 9-1-1 Dispatch Center is equipped with 8 Motorola Gold Elite radio dispatch positions. Typically, 6 of the positions are active.



● = Repeaters ● = Joint RX Site ● = RX site ● = PSAP

CURRENT VHF SYSTEM

Infrastructure

The radio system utilizes digital telephone line connectivity which is more reliable that standard analog "copper" circuits. These circuits contribute to the reliability of the system in regards to "availability".

As will be seen later in this report, however, the system's VHF radio site configurations present several operational and performance challenges. And, most of the current equipment is at, or is reaching, its end-of-service life, meaning the equipment providers (primarily Motorola) are no longer supporting the equipment from a hardware and/or software standpoint. This puts the Lewiston-Auburn radio system in a vulnerable position should certain equipment begin to fail.

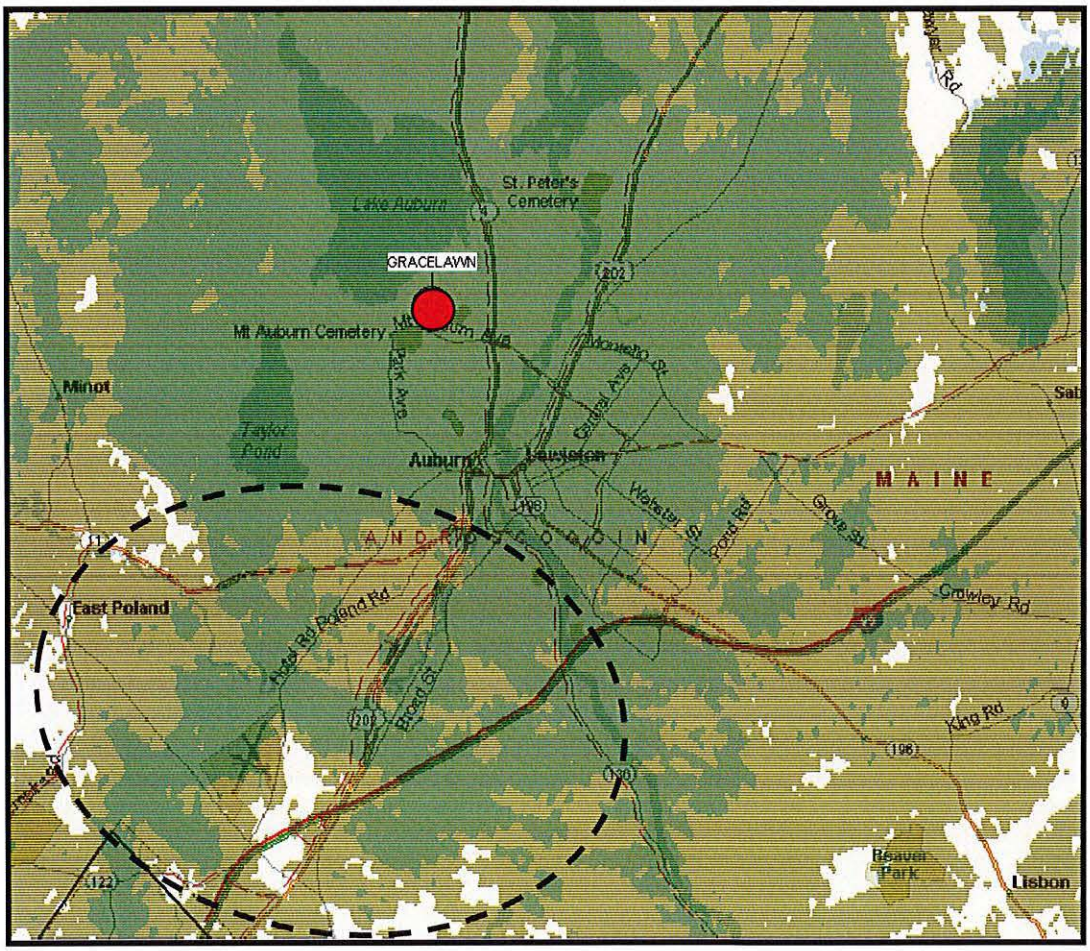
System coverage is reviewed in the next section.

2.0 SYSTEM COVERAGE STUDY

Using system information provided by Lewiston-Auburn 9-1-1 and data from the FCC licensing database, TCS developed the following computer-generated coverage maps to illustrate the VHF coverage provided by both main TX/RX (transmit/receive, or repeater) sites and the coverage provided by the remote RX (receiver) sites.

The following preliminary analysis is based upon a review of the results of the computer-generated system coverage. Emphasis is placed upon assessing system performance as experienced by a user's portable radio, worn at the hip (which is the public safety radio communication standard).

Preliminary AUBURN Coverage Analysis



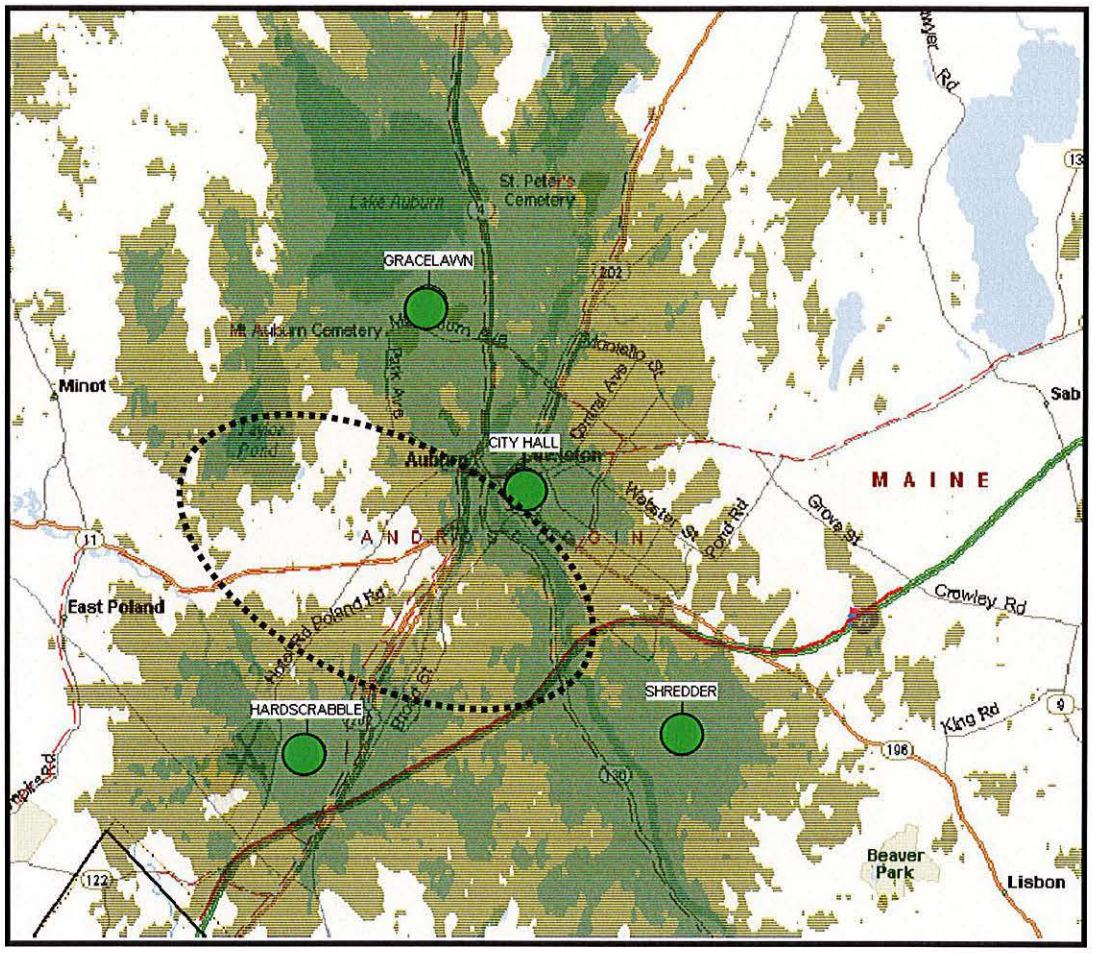
AUBURN COVERAGE from GRACELAWN tower ("talk-out")
GREEN = portable on street YELLOW = mobile

The Gracelawn site houses the primary repeaters for Auburn's Police and Fire agencies. It is located north of the center of the city. The site does not provide centralized coverage for Auburn, but rather favors the north end of the city. Reliable portable radio coverage drops off below Route 11 (as shown by the dashed lines). An initial analysis would expect poor portable performance south of the city with some terrain "bumps" that might help coverage (slightly east of the airport). It is expected that mobile radio coverage is satisfactory.

Auburn's remote receivers are located in Lewiston City Hall, at the Hardscrabble site, and at the Shredder site (east of the river).

The Lewiston City Hall site antennas are mounted within the bell tower on the top of the building structure. The bell tower's openings are closed in with metallic screening which, coupled with the brick walls, probably impacts the effectiveness of the site.

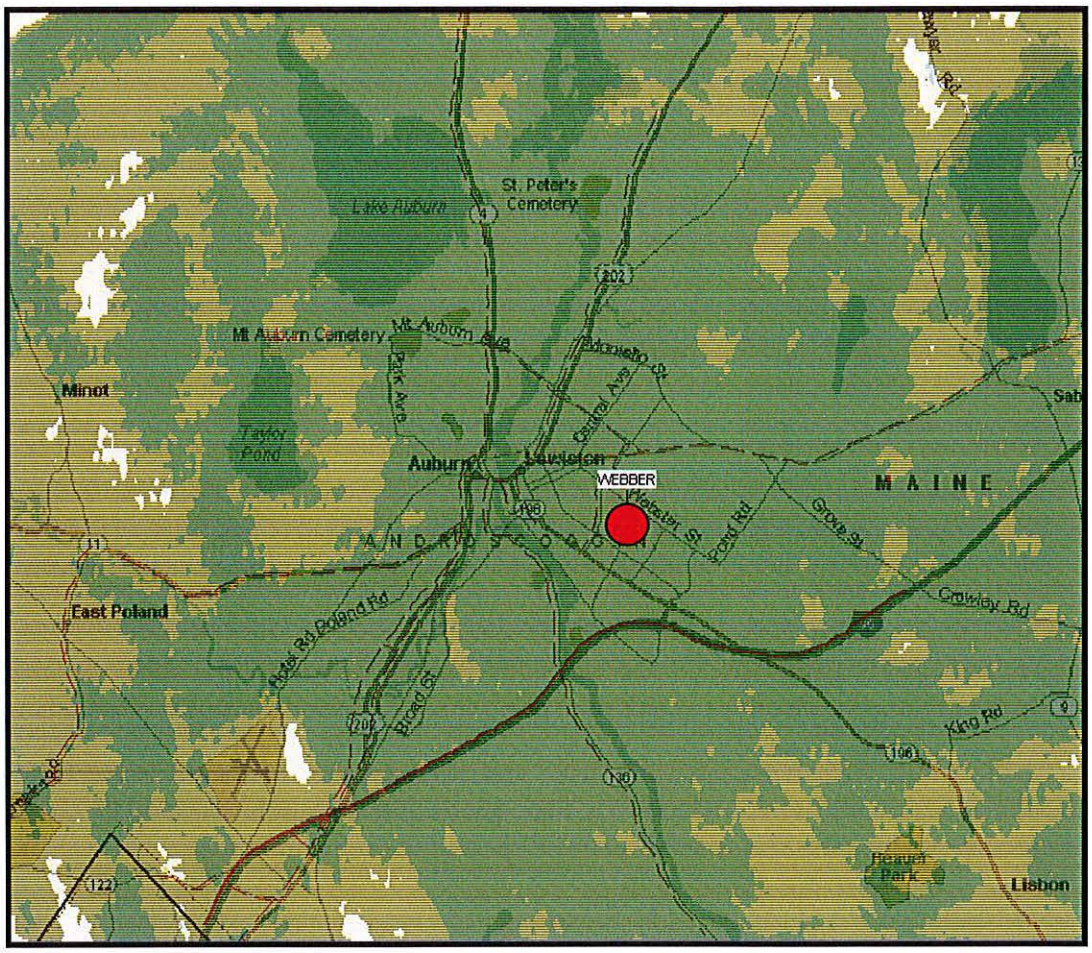
The Hardscrabble site is on a 40 ft. tower located near a large ground-mounted water tank. The tower height is not optimum for a VHF radio site. The limited tower height could be a result of the site's proximity to the airport; however, it does not appear to be in the flight path of either runway. The site is well south of the effective portable talk-out range of the Gracelawn site; it is expected that portable users would have performance problems in this part of the radio system.



Effective coverage from AUBURN Remote Receivers ("talk-in")
GREEN = portable on street YELLOW = mobile

The map indicates portable talk-back is insufficient west of Auburn, along the Rt. 11 corridor, and to the south.

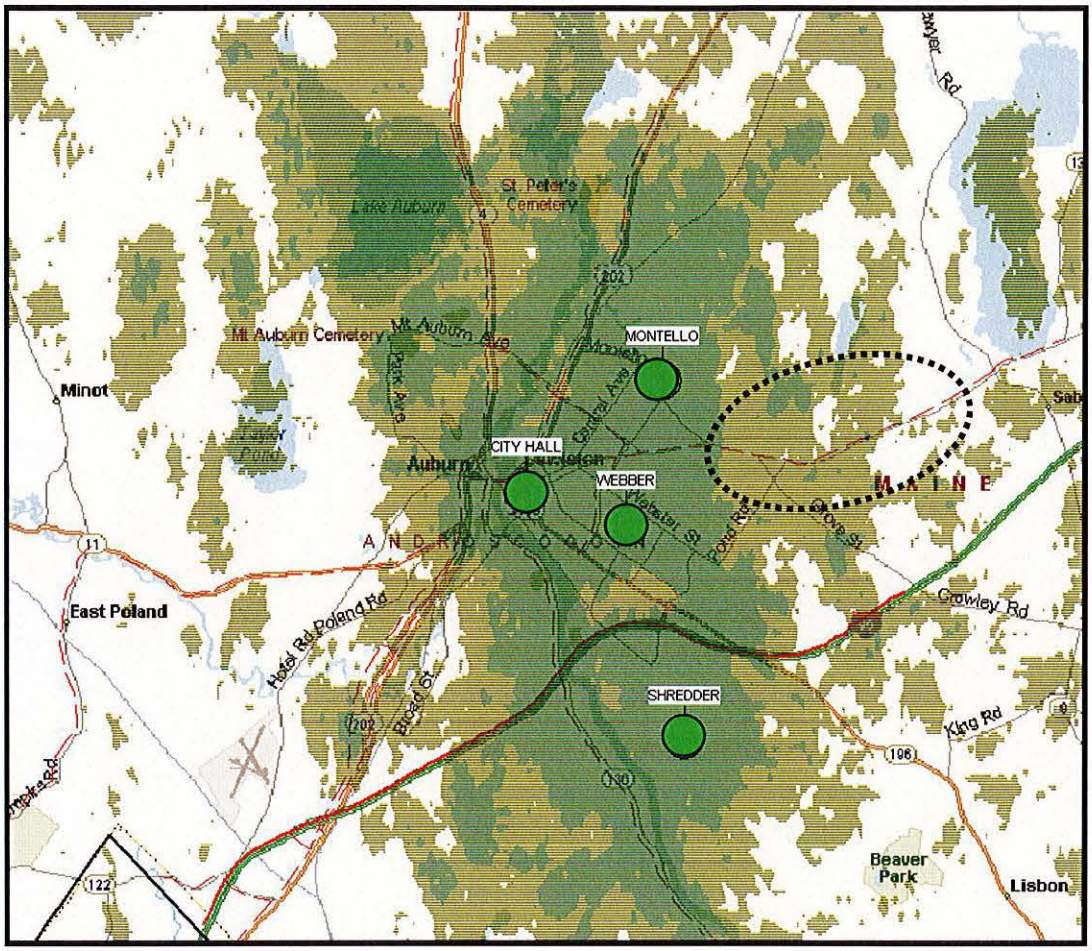
Preliminary LEWISTON Coverage Analysis



LEWISTON COVERAGE from WEBBER tower ("talk-out")
GREEN = portable on street YELLOW = mobile

The primary Lewiston repeaters are located at the Webber Road site, south and east of the city center. This site appears to provide satisfactory "omnidirectional" coverage in and around Lewiston proper.

Remote receivers are located at Montello, north and east of the city center, Lewiston City Hall, and the Shredder site, which is south and east of the city center, south of Interstate 95. Both Montello and Shredder appear to be placed in optimum locations, providing a balanced talk-back path for portable users. The Lewiston City Hall provides close-in coverage.



Effective coverage from LEWISTON Remote Receivers ("talk-in")
GREEN = portable on street YELLOW = mobile

Coverage from Montello south to Shredder is satisfactory. Coverage to the east of Lewiston drops off due to terrain. The model also shows some terrain-related coverage challenge just north of I-95, south of the Webber site.

User Input – Questionnaires and Interviews

Prior to inspecting the radio system and interviewing users, a TCS Radio System Questionnaire was distributed to the user community. The Questionnaire is used to solicit system use and performance information from the users; it asks for details about the user's equipment and perception of system operation. The Questionnaire specifically asks the user to identify any areas that might not be providing satisfactory service.

Lewiston and Auburn Police and Fire Departments and the PSAP provided very useful feedback. More than 40 Questionnaires were returned.

Questionnaire Results:

Reliability	Portable coverage 80-98% - mobiles OK
Batteries	6-16 hours (old vs new batteries)
Portable Coverage Issues	St. Mary's, CMMC, Jail, Walmart, Schools, Sabattus, Lisbon, Irving Truck stop, Turnpike, Washington St., south of airport, Lake area, Denville Corner Rd., Beat 3, Eng. 4 area, Jail, Lewiston City Hall/Lewiston PD HQ, Communications, mills
Equipment	FD requests portables with displays and scanning, speaker mics for drivers (LFD) - vehicle repeaters? In-house base versus use of portables (AFD)
Operations	Long transmissions; calls are "stepped on" by others

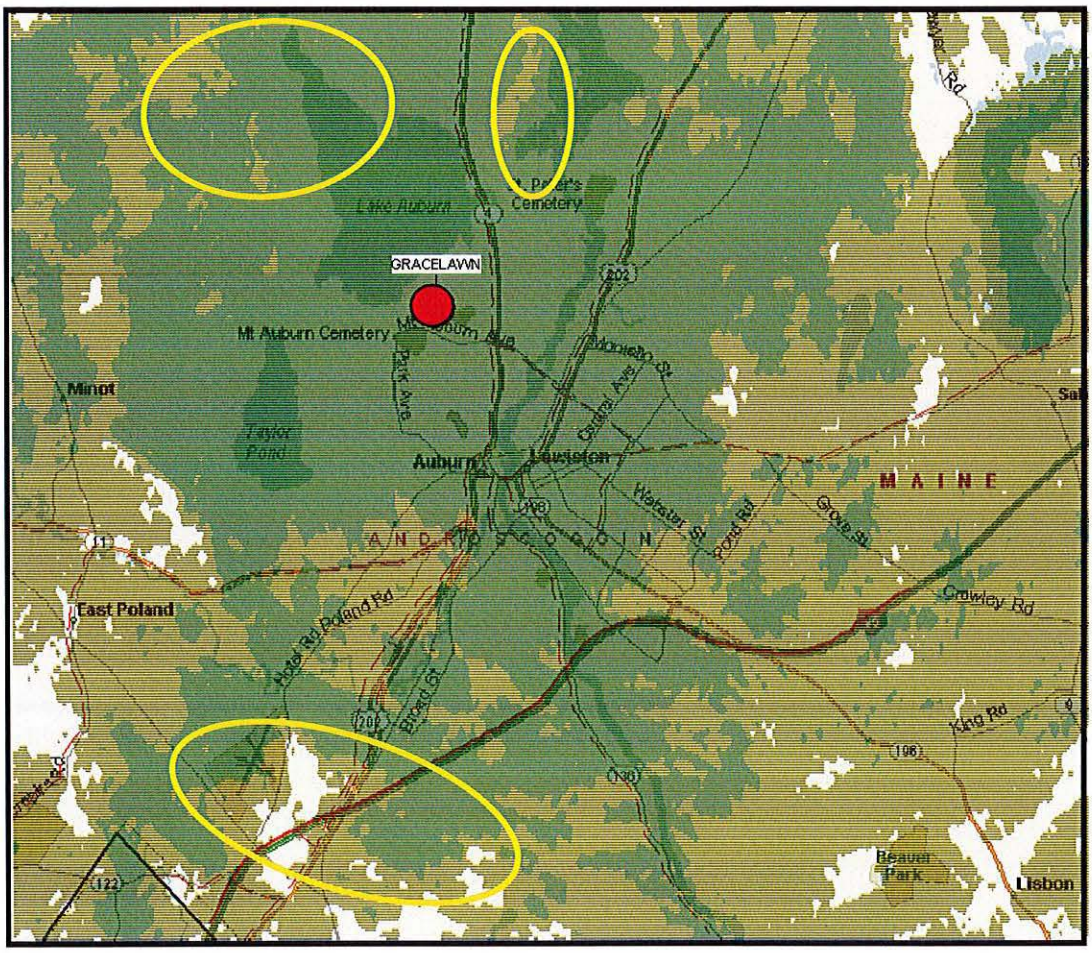
PERFORMANCE ISSUES IDENTIFIED IN QUESTIONNAIRES

The performance issues reported for both Auburn and Lewiston were related to portable radio coverage. The general consensus was that mobile radio performance was satisfactory within and around the cities.

- Auburn - the relocation of the Auburn repeaters from Goff Hill to Gracelawn reduced coverage to the west and south of the city. While a remote receiver is located at Hardscrabble, a portable user might have trouble hearing Dispatch calls in that area. Most of the coverage issues reported for Auburn in the Questionnaires were in the southern part of the city border, around the Airport. Coverage challenges north of the Lake and along N. River Road is attributable to terrain blockage.

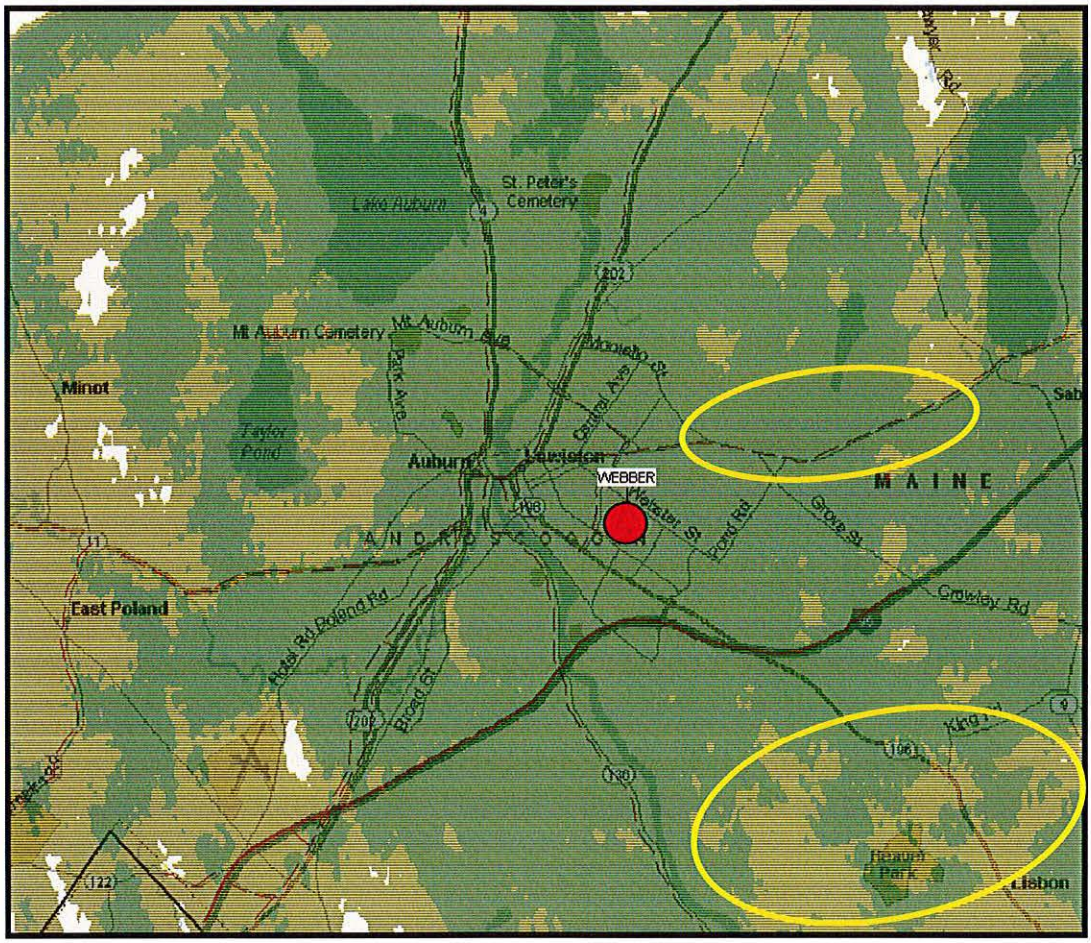
- Lewiston – the coverage provided by the Webber repeater site is augmened by the location of the City Hall, Montello and Shredder receiver sites. However, there is a drop-off in talk-back coverage to the east of the city along Highway 126 due to terrain. The Questionnaire reports mentioned the Beat 3 and Engine 4 areas, both of which are east of the city. In this case, users traveling east of the city would continue to hear Dispatch, but portable talk-back to Dispatch would be limited.

- Several buildings were noted as having coverage challenges (CMMC, St. Mary's, schools, large commercial/industrial buildings, mills). This is not unexpected with the use of VHF. VHF, due to the wavelength of the signal, does not penetrate buildings well. VHF signals "politely" stop at the front door. The use of bid-directional amplifiers (BDA's) can resolve in-building coverage issues, but at a high cost; and, there is the potential a BDA could create interference to the system. Once a system solution is selected, TCS will address in-building coverage issues.



YELLOW CIRCLES = Reported <u>Auburn</u> coverage problem areas

Reported Auburn issues: Irving Truck stop, Turnpike, Washington St., south of airport, NW Lake area, N. River Road, Denville Corner Rd.



YELLOW CIRCLE = Reported <u>Lewiston</u> coverage problem area

Reported Lewiston issues: Beat 3 & Eng. 4 areas, Sabbatus, Lisbon

The Lewiston repeater provides good coverage to the east and southeast. However, the current remote receivers (map on page 9) do not "hear" well east of where Montello Street intersects with 126, towards Sabattus. Coverage does fall off at Sabbatus and Lisbon.

Users Meeting

TCS met with representatives of the Auburn and Lewiston Police, Fire, Public Works and the 9-1-1 PSAP departments and used the results of the Questionnaires and the above maps to review current system performance. The attendees concurred that the propagation model provided an accurate picture of current coverage and that the problem areas reported in the Questionnaires were accurate.

Several recommendations were discussed, ranging from more-immediate "fixes" through an entire system upgrade/replacement.

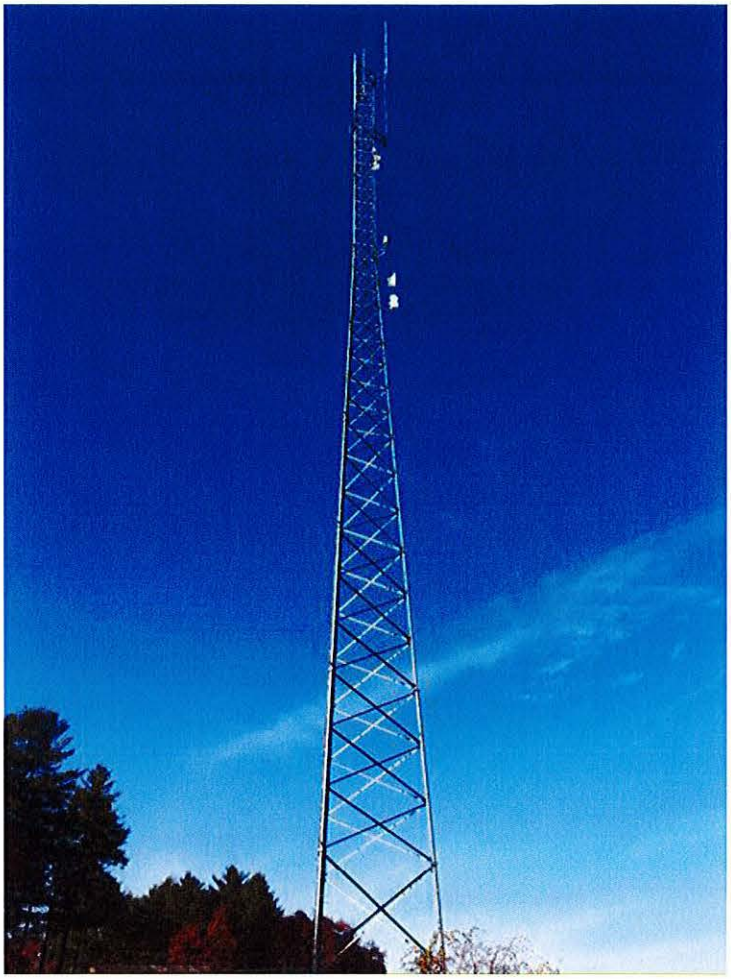
A subsequent meeting was held with the 9-1-1 Board. Current system performance issues were reviewed and TCS recommendations were discussed in depth.

Site Inspections

TCS visited all system sites and inspected the equipment, antennas, towers, and auxiliary equipment. All sites are in fair to good condition.

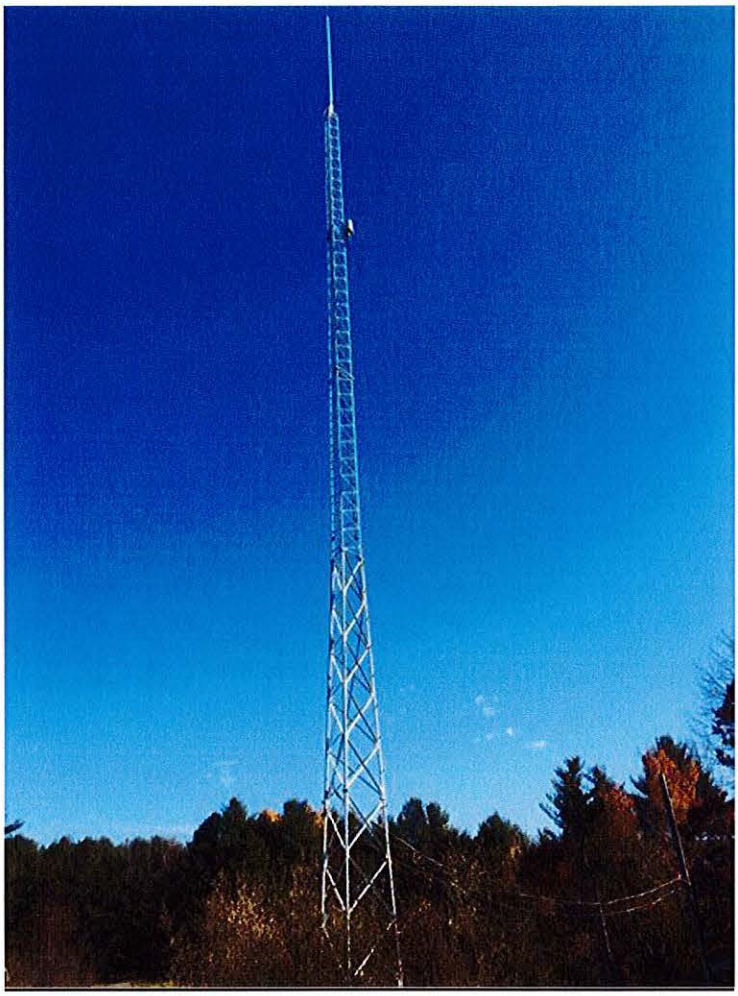
Lightning protection grounding at all sites is adequate and generally follows the Motorola R56 Installation Standards.

The following photographs show the towers at each site.



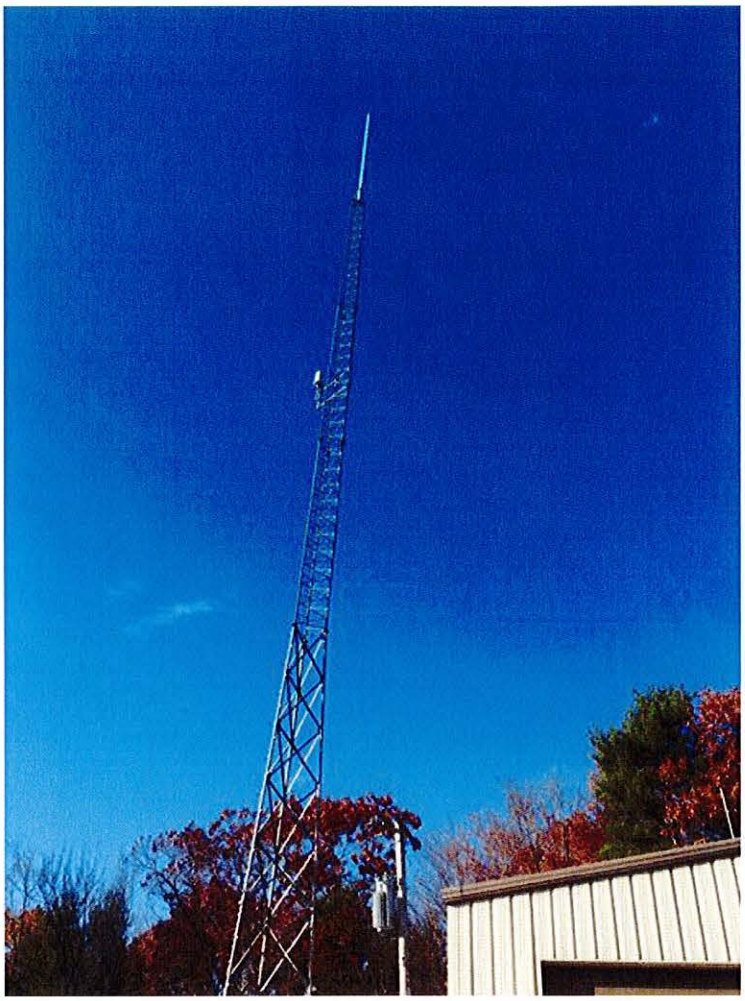
AUBURN SITE - GRACELAWN
180 FT. TOWER

AUBURN SITE - HARDSCRABBLE
40 FT. TOWER



LEWISTON SITE - MONTELLO
100 FT. TOWER

LEWISTON SITE – WEBBER
180 FT. TOWER



LEWISTON/AUBURN SITE – SHREDDER
100 FT. TOWER

LEWISTON/AUBURN SITE – LEWISTON CITY HALL BELL TOWER (Photo provided by Lewiston-Auburn 911)

Equipment shelters (if used) are in fair to good condition. Most of the locations are not suitable for newer system equipment which typically requires a conditioned environment (heating and air conditioning).

The Montello, Shredder, and Hardscrabble towers might need to be replaced if a new microwave-connected system is implemented. The Lewiston City Hall site should be replaced with a more-suitable city-center site.

3.0 PHASED IMPLEMENTATION OF NEW EQUIPMENT AND CAPABILITIES

This section addresses recommendations related to improvements in the current VHF system through a complete system upgrade. Suggested short-term fixes are presented to resolve the current system issues. TCS always attempts to develop a "roadmap" for system evolution that accommodates both short and long-term changes that maximize a return on any investment made.

There was some discussion about a "VHF simulcast" system that would provide better area-wide coverage. It has been TCS's experience that wide-area conventional simulcast systems are expensive to deploy and do not mitigate the issues inherent to using the VHF radio band: interference, electrical noise, poor in-building signal penetration, limitations to available radio channels (FCC issues with licensing), etc. The cost to develop a simulcast system that would provide the same operational "channels" as currently used could approach several million dollars. TCS can investigate this type of design if required, but believes the money spent would be best applied to a final system design that would have long-term value and provide Lewiston-Auburn with modern public safety features.

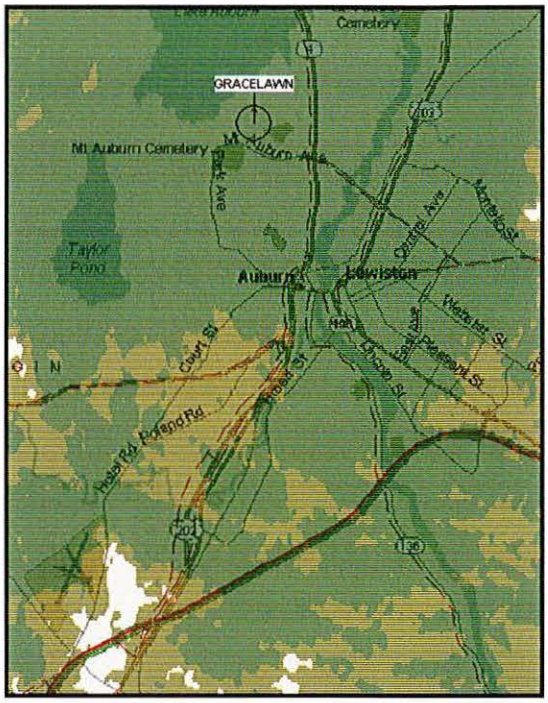
The following recommendations are based upon the results of the propagation analysis, discussions with the 9-1-1 PSAP team, and input provided by the user agencies.

Step 1 – Address Current VHF Radio Coverage Issues

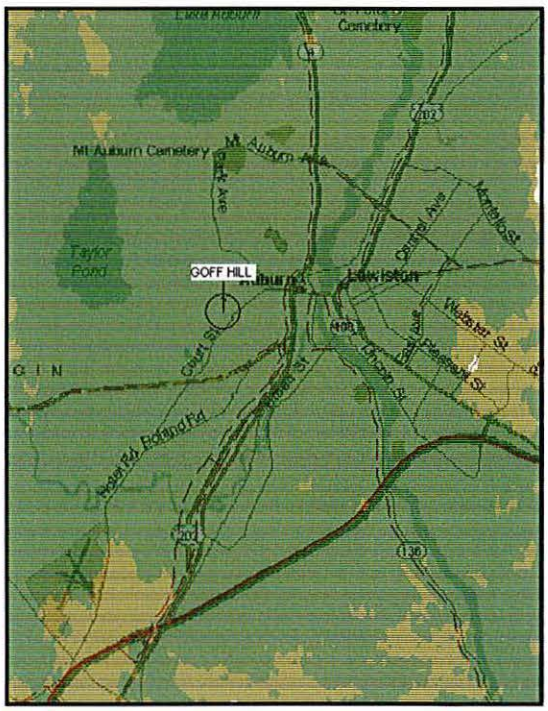
1. Relocate the Auburn Repeaters from Gracelawn to a location west of Auburn (Goff Hill is in a suitable location, but its past issues would need to be addressed).
2. Move the four (4) Auburn remote receivers from Lewiston City Hall to the Gracelawn site.
3. Add a remote RX site east of Lewiston.
4. Create a detailed technical specification/scope of work for this task. This would help to understand the costs, and would describe in detail the steps to be taken to bring about the recommended changes without disrupting existing communications.

BUDGETARY COST: The cost of the VHF upgrade effort will be highly dependent upon the sites that are needed for both the west-of-Auburn area and the area east of Lewiston. TCS can assist with locating and identifying sites that would work.

The following maps illustrate the change in Auburn coverage provided by moving the repeaters from Gracelawn to Goff Hill.



Current Gracelawn Coverage



Proposed Goff Hill Coverage – 150 ft.

Step 2 – Replace Radio Dispatch Equipment

1. Replace the 9-1-1 Motorola Gold Elite radio dispatch terminals (manufacturer-discontinued) with IP-based, P25-compatible terminals.
2. Develop technical specifications and operational requirements for the new equipment.
3. Create an RFP for the radio dispatch equipment upgrade, solicit proposals
4. Evaluate proposals
5. Identify the most-compliant proposal.

BUDGETARY COST: For budgetary purposes, each console position would cost approximately $80,000 ($640,000 for the eight current positions).

It should be noted that a decision on a console provider must be made with a view towards a future P25 digital system makeup. While there are industry-approved "interfaces" that allow one vendor's P25-compatible console to operate another vendor's P25 digital base stations, this type of configuration limits console/base station capabilities. A two-vendor system only opens the door for "finger pointing" if there are problems.

➢ *Steps 1 and 2 could be implemented concurrently, if funding is available.*

Step 3 – Develop a Conceptual Design for a Lewiston-Auburn 800 MHz P25 trunked digital radio system

1. Develop technical specifications for a Lewiston-Auburn shared simulcast trunked 700/800 MHz P25 digital system, including:
    a. Conceptual design
    b. Estimated budget
    c. Estimated Procurement/Implementation Timeline
2. Create an RFP for the P25 system, solicit proposals
3. Evaluate proposals
4. Identify the most-compliant proposal

BUDGETARY COST: assuming a 6-site design with microwave connectivity, the overall cost is estimated to be $6-8 Million. Competitive bidding could bring this number down.

➢ *The 800 MHz P25 Conceptual Design will take into account potential expansion of the Lewiston-Auburn system into the rest of Androscoggin County. Most vendor's P25 systems are designed for plug-and-play expansion; they would not require any core-system rework. Further design work would be needed to determine the number of County-wide sites needed.*

Estimated Timelines

- The VHF reconfiguration work could take 6-12 months, depending upon the time it takes to acquire the needed sites, site work required, telephone line provisioning, etc.

- The 9-1-1 radio dispatch console upgrade project could take approximately 6-10 months to complete.

- A new 800 MHz P25 digital RF infrastructure implementation could take 18-24 months to complete, depending upon final system design and availability of required sites.

Motorola Proposal Review

Motorola submitted a proposal to Lewiston-Auburn in 2013 that incorporated an upgrade of the radio dispatch consoles and the radio base station equipment at the tower sites. This would have resulted in a VHF conventional, IP-connected APCO P25 system. The quoted cost for this upgrade is $1.8 Million. This proposal is an equipment upgrade only; the proposal does not address system performance (coverage) issues.

While the radio dispatch consoles need to be replaced, an upgrade of the current VHF system to a VHF P25 system as described in the proposal would not resolve the current coverage challenges and could be problematic. TCS has extensive experience with the investigation of poorly-performing VHF P25 systems that are plagued by interference, high noise levels, and radio frequency channel limitations. While VHF P25 might be suitable for wide-area systems (such as statewide systems with mobile-based users) it is not suitable for citywide networks. The VHF P25 systems that TCS has evaluated have been converted to 700/800 MHz per TCS recommendations.

TCS does not recommend that the Motorola proposal be considered, as submitted. Alternatively, Motorola could be directed to eliminate the RF infrastructure equipment (P25 base stations) and requote the Dispatch console upgrade. This would result in a proposal that would address Step 2 described above.

SUMMARY

Lewiston-Auburn currently operates a VHF radio network that has several operational and technology issues:

- The move of the Auburn repeaters from Goff Hill to Gracelawn created a coverage problem west and south of the city.
- Lewiston has limited portable talk-back coverage towards the east.
- The base station equipment, dispatch consoles, and much of the current portable and mobile radio inventory is reaching, or has reached, end-of-life.

TCS has recommended a three-step approach to improving the overall performance of the Lewiston-Auburn radio network. The recommendations have been developed to improve radio system performance for Lewiston-Auburn's first responders.

Once Lewiston-Auburn has had an opportunity to review the recommendations and has made a decision as to how to move forward, TCS will begin work on the Phase II tasks:

- guidance in the preparation of a request for proposal (RFP) to solicit bids for a new system-wide upgrade*
- analysis of proposals received via the RFP process
- identification of the most-compliant technical proposal and award recommendation

*The Lewiston-Auburn Consultant RFP required a system analysis and development of an RFP for system upgrade. The current VHF system issues can be addressed by means of short-term configuration changes. These changes, which include adding sites to the current system, would have future value if properly planned. Should Lewiston-Auburn wish to pursue this interim upgrade ("Phase 1.5"), TCS can provide the additional task support by means of a Change Order.