

Boxborough Massachusetts

Public Safety Radio System

Introduction

- Richard Davol
- President
- Communication Consulting Service, Inc.
- Company Established in 2001.
- First Class FCC license since 1976.
- 42 years in Radio and Electronics.
- 35 of those years employed as a Communication Engineer.

Mission

- Evaluate the current Police, Fire and Public Works radio communications.
- Determine the current and future needs of the public safety communications.
- Strategic and specific recommendations to assure and improve the safety of the public.
- Provide those emergency services within an efficient and cost effective communications system.

Existing System Overview

Radio Equipment

- Three separate radio systems.
- The Police Department utilizes VHF Repeaters with voting receivers.
- The Fire Department operates on a mixture of UHF and Low Band with a Cross Band Repeater and a remote Low Band Base Station.
- The DPW operates on Low Band using (Simplex) radio to radio communication.

Existing System Overview

Dispatch Console

- Two different Motorola models.
- No communication between consoles.
- Both models discontinued.
- No technical or parts support.
- No Interoperability through console.
- Parts have been purchased on EBay to repair the console voter.

Motorola Comtegra



Motorola Command Star Lite



Fire Department Infrastructure

- Single Base Station located at 85 Swanson Road.
- Mobile radio with external 100 watt amplifier.
- Base Operates on Low Band 46.50 MHz
- Connected by leased Analog Telephone Lines.
- Constant Telephone Line problems.
- Coverage issues to the East and in buildings.

- Cross Band UHF/Low Band repeater at Hager Cell Site.
- Operates on UHF/ Low Band 471.600Mhz/ 46.50Mhz.

Police Department Infrastructure

- Repeater located at 85 Swanson Road.
- Operates on VHF High Band 154.6475.
- Connected by leased Telephone Lines.
- Constant Telephone Line problems.
- Coverage issues to the east and in buildings.
- Second repeater for Hager Cell Site out of service for over 75 days.
- Officers must change channels. This is a safety issue.

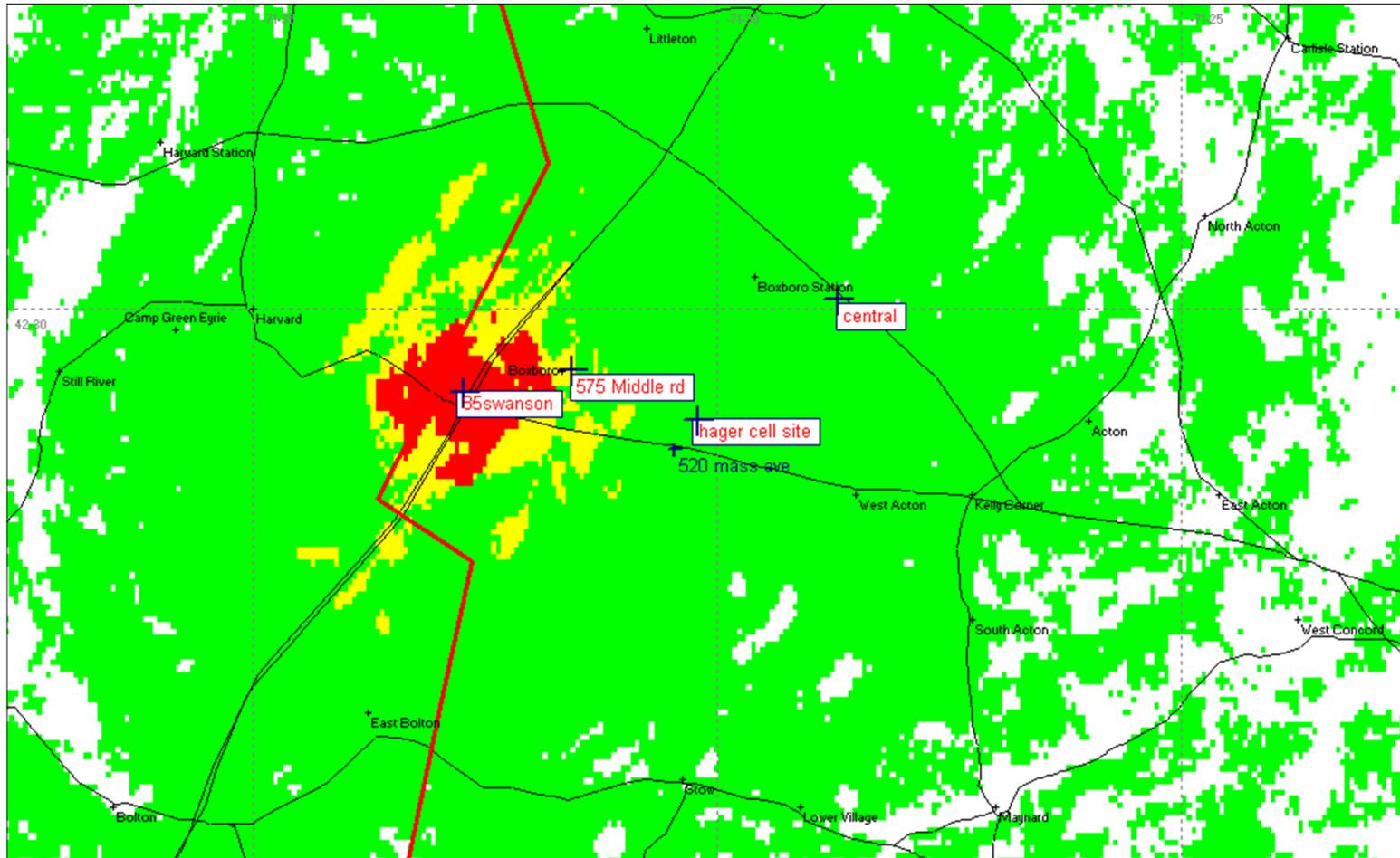
DPW Infrastructure

- Single Base Station located at DPW Garage.
- Mobile radio used as Base Station.
- Operates on Low Band 46.58 MHz
- Coverage issues in town.
- Simplex radio to radio communication.
- No FCC License.
- Base Station antenna and mounting needs upgrade.
- Interoperability with Fire Department only.

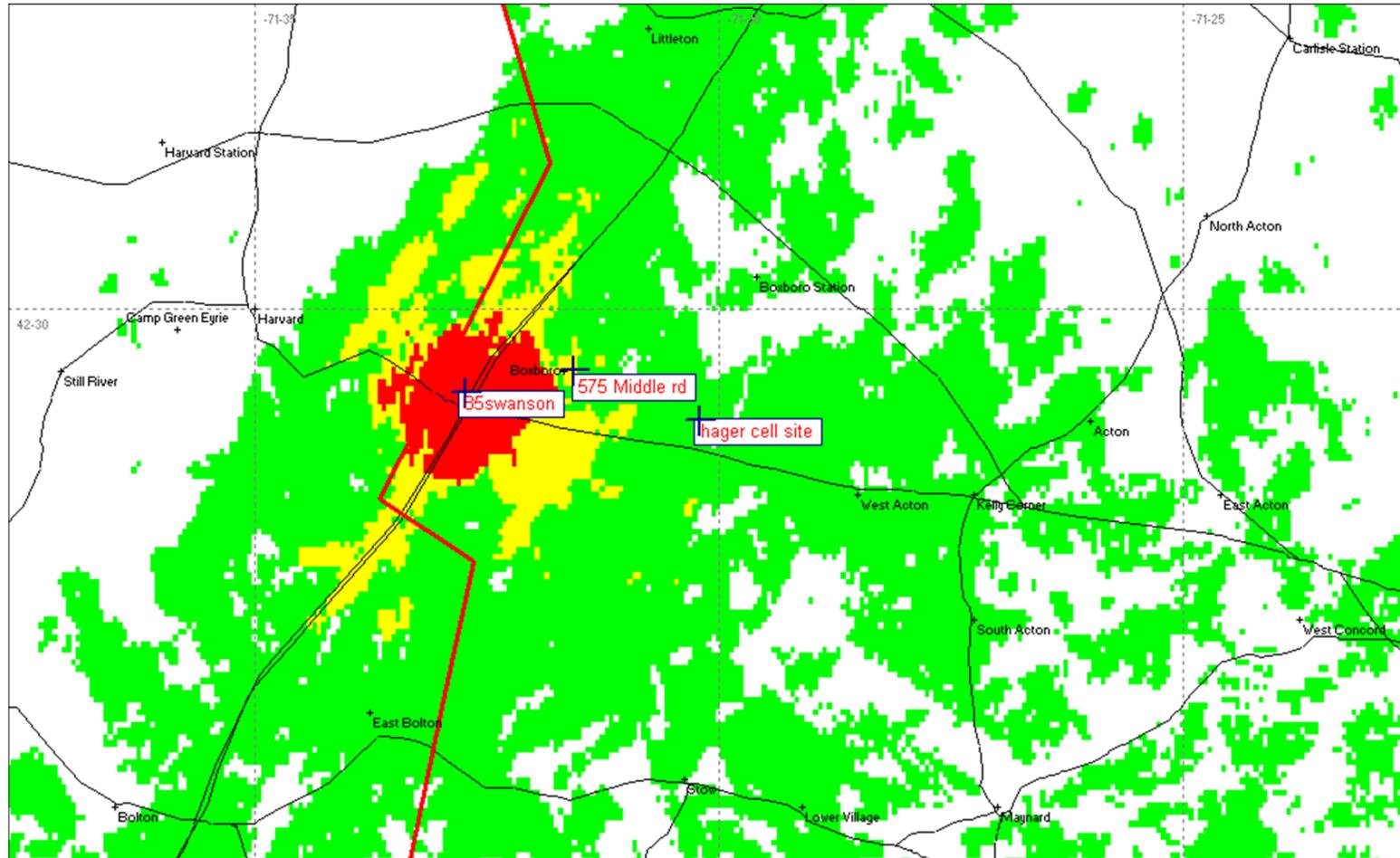
Mobile and Portable Radios

- Fire Department
 - Motorola CDM1250 Mobiles
 - Motorola HT1250 Portables
 - Pyramid SNR200 Vehicle Repeaters
- Police Department
 - Motorola MCS2000 Mobiles
 - Motorola XTL2500 Portables
- DPW
 - Mixture of Models
 - Motorola CDM1250 Mobile
 - Kenwood Mobiles
 - Vertex Mobiles
 - No Portables

Existing VHF Talk Out



Existing UHF Talk Out



Recommendations

New Infrastructure Police and Fire

- Dispatch Console with Cross Band Patch.
- Three site UHF Simulcast System.
- Three site VHF Simulcast System.
- Point to Point link to interconnect all sites.
- Locations:
 - Swanson Road
 - Middle Road
 - Hager Cell Site

Recommendations

New Infrastructure DPW

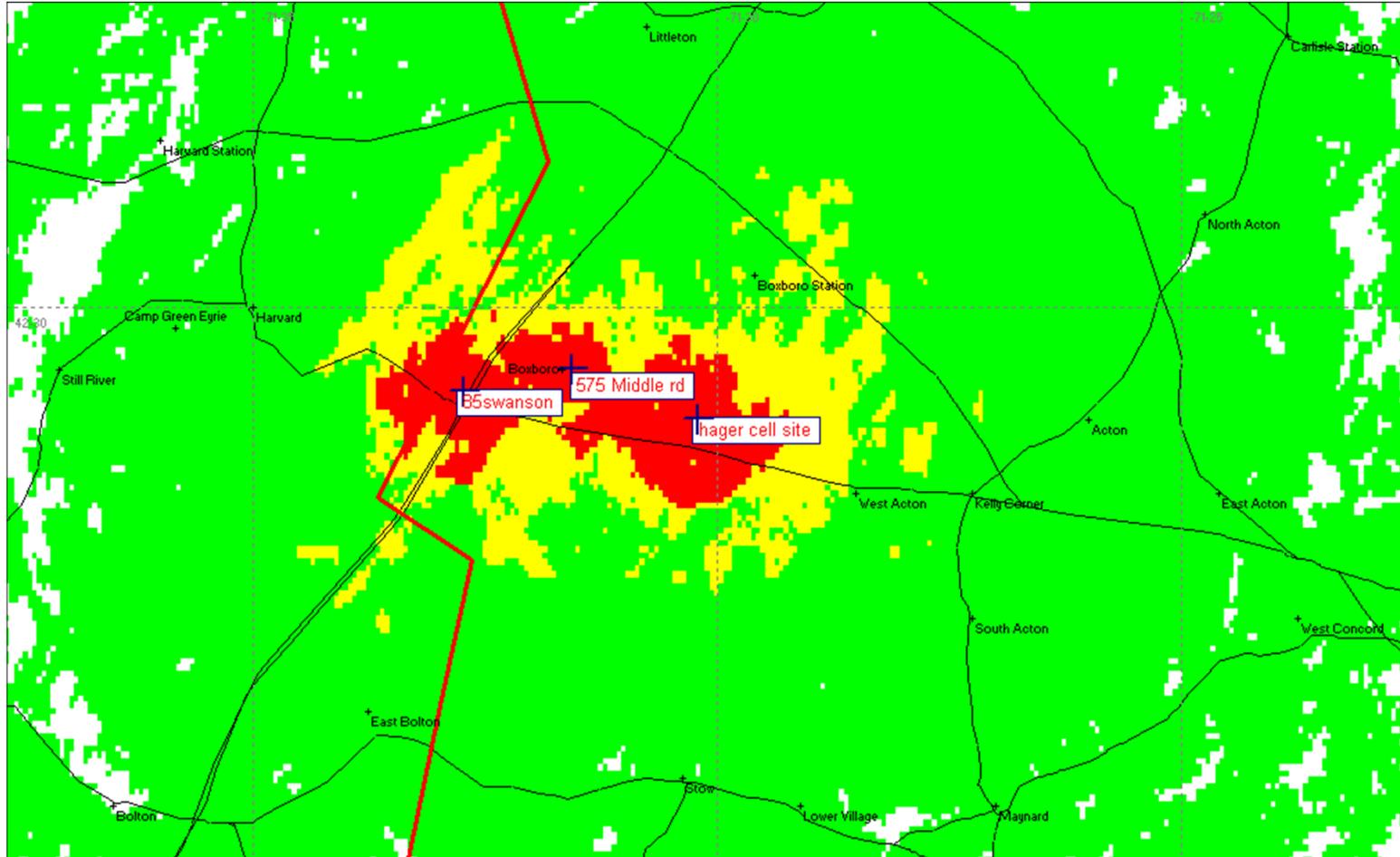
- Stay on low band
- New Base Station antenna and mounting system.
- File for New FCC license (may require frequency change).
- 6 new Low Band mobile radios.
- 6 new Low Band portable radios.
- From an Engineering perspective, a UHF repeater system would be preferable.

Recommendations

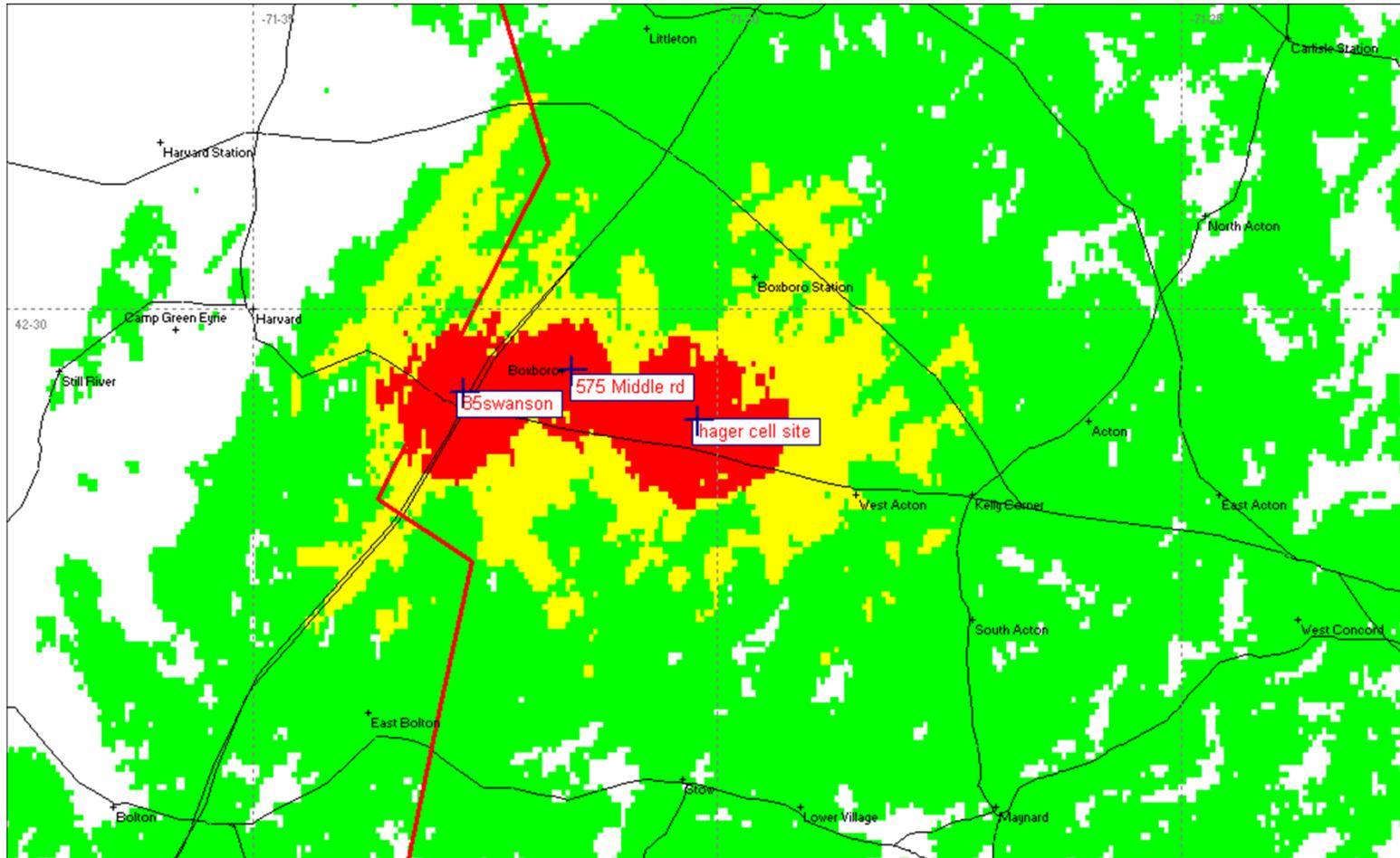
Mobiles and Portables

- Fire Department Mobiles and Portables.
 - Current models in good working order.
 - Need a couple of Vehicle Repeaters.
- Police Department Mobiles and Portables.
 - Current models in good working order.
- DPW Mobile and Portables.
 - All vehicle radios need Technical Service
 - Need additional mobiles.
 - Need to add new portables.

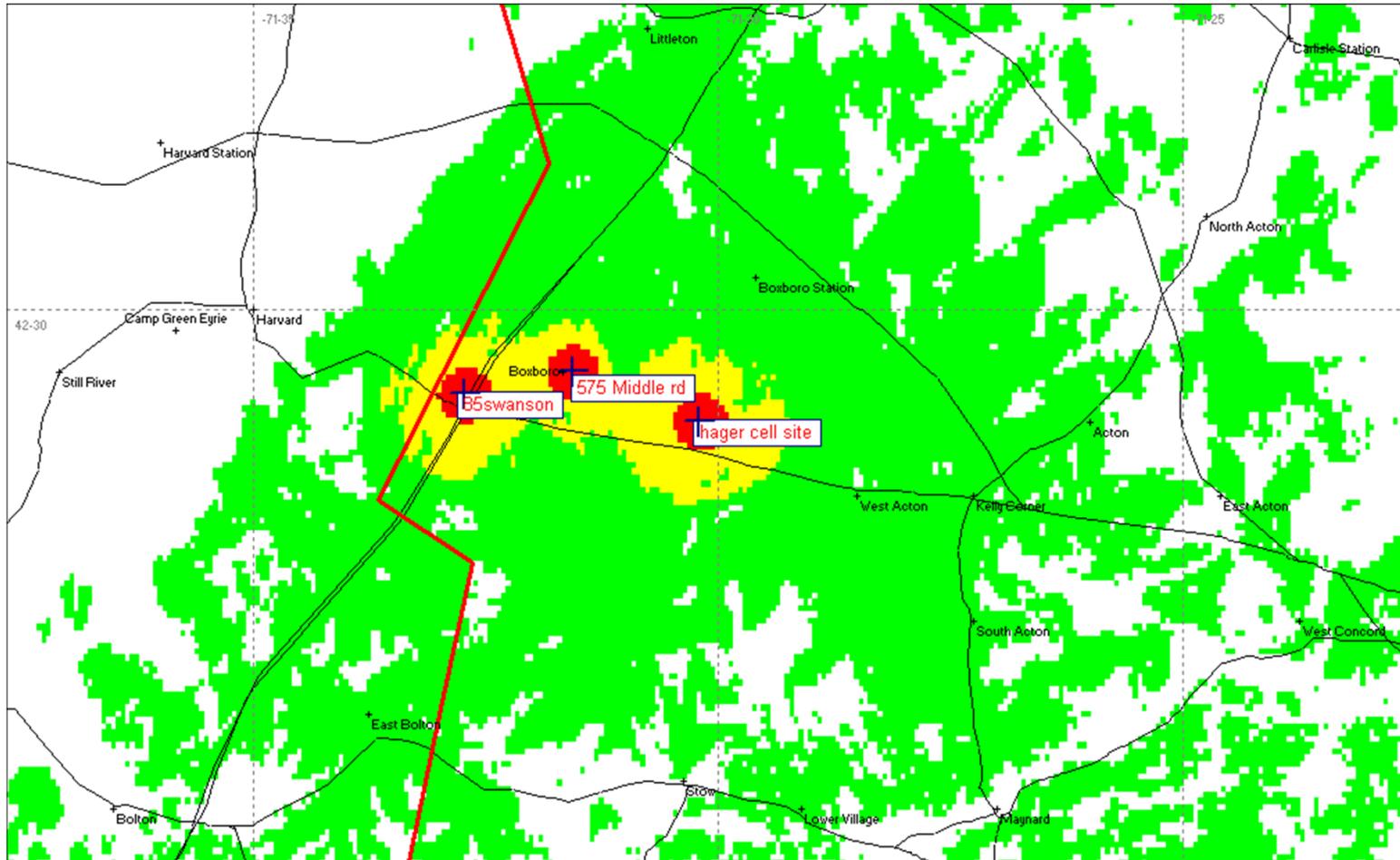
Proposed New Police Department VHF Talk Out



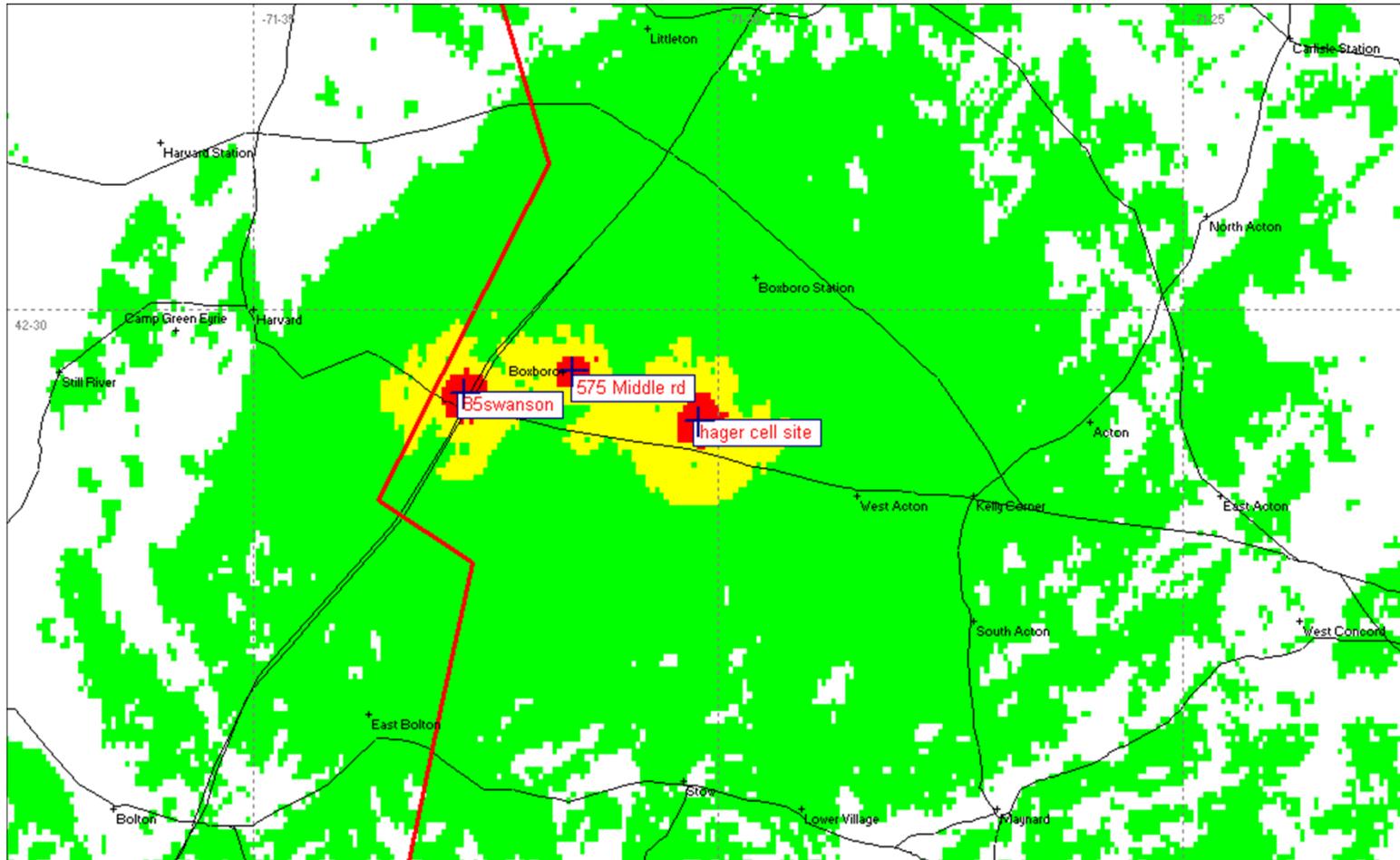
Proposed New Fire Department UHF Talk Out



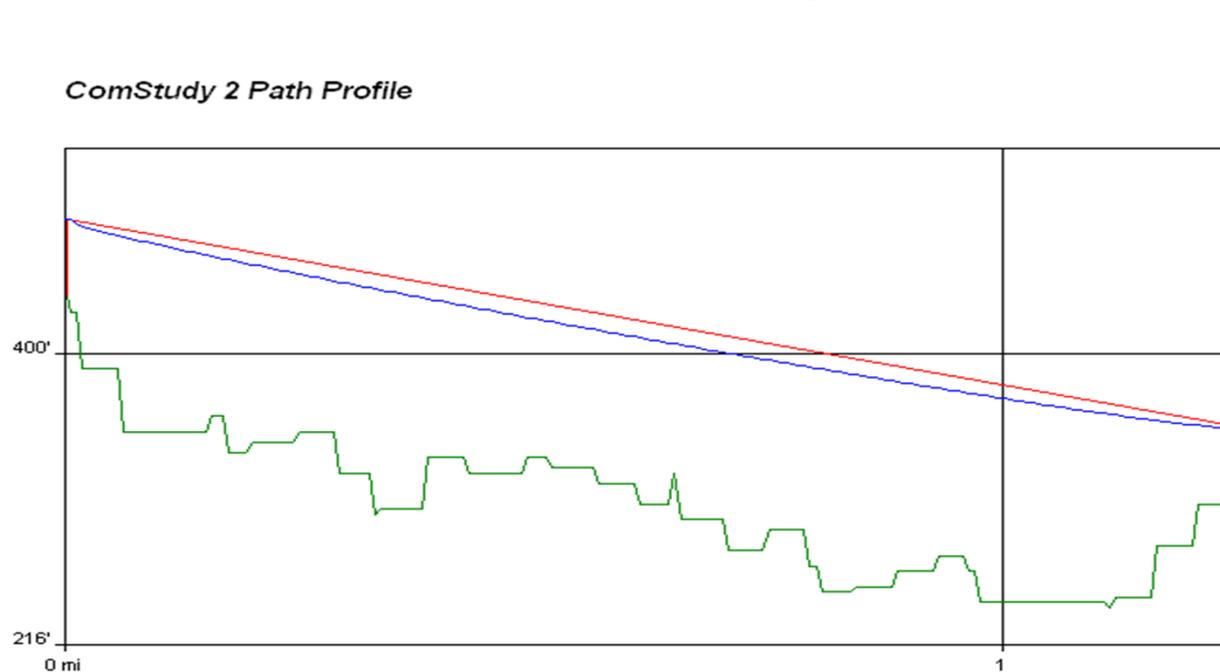
Proposed New Fire Department UHF Mobile Talk Back



Proposed New Police Department VHF Mobile Talk Back



Proposed New Point to Point Link Middle Road to Hager Cell Site



575 Middle rd

Lat: 42-29-30.3 N
Lon: 71-31-34.1 W
AMSL: 437 ft
Tower AGL: 50 ft

hager cell site

Lat: 42-29-06.4 N
Lon: 71-30-11.8 W
AMSL: 305 ft
Tower AGL: 49 ft

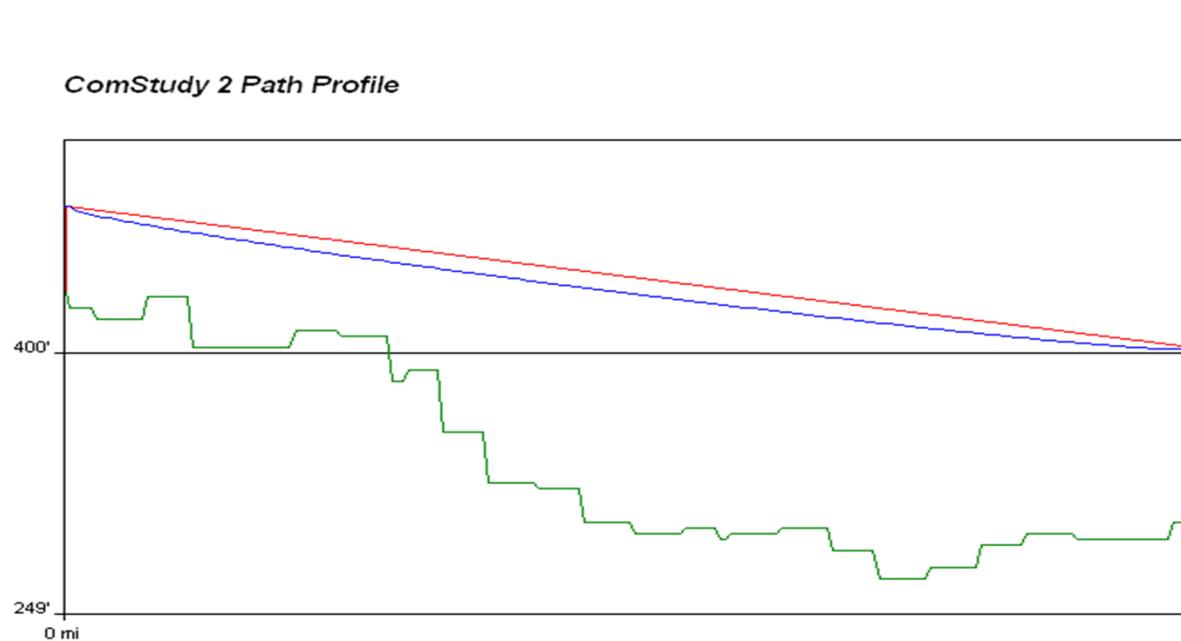
Profile Info

Distance: 1.25 mi
Bearing: 111.46 deg
of points: 200
K value: 1.333
Frequency: 4900
Clearance: 0.6

Losses

Base Loss: 112.3 dB
Fade Margin: 45.7 dB
Diffraction: 0.0 dB
Fresnel: 0.0 dB

Proposed New Point to Point Link Middle Road to Swanson Road



575 Middle rd

Lat: 42-29-30.3 N
Lon: 71-31-34.1 W
AMSL: 437 ft
Tower AGL: 49 ft

85swanson

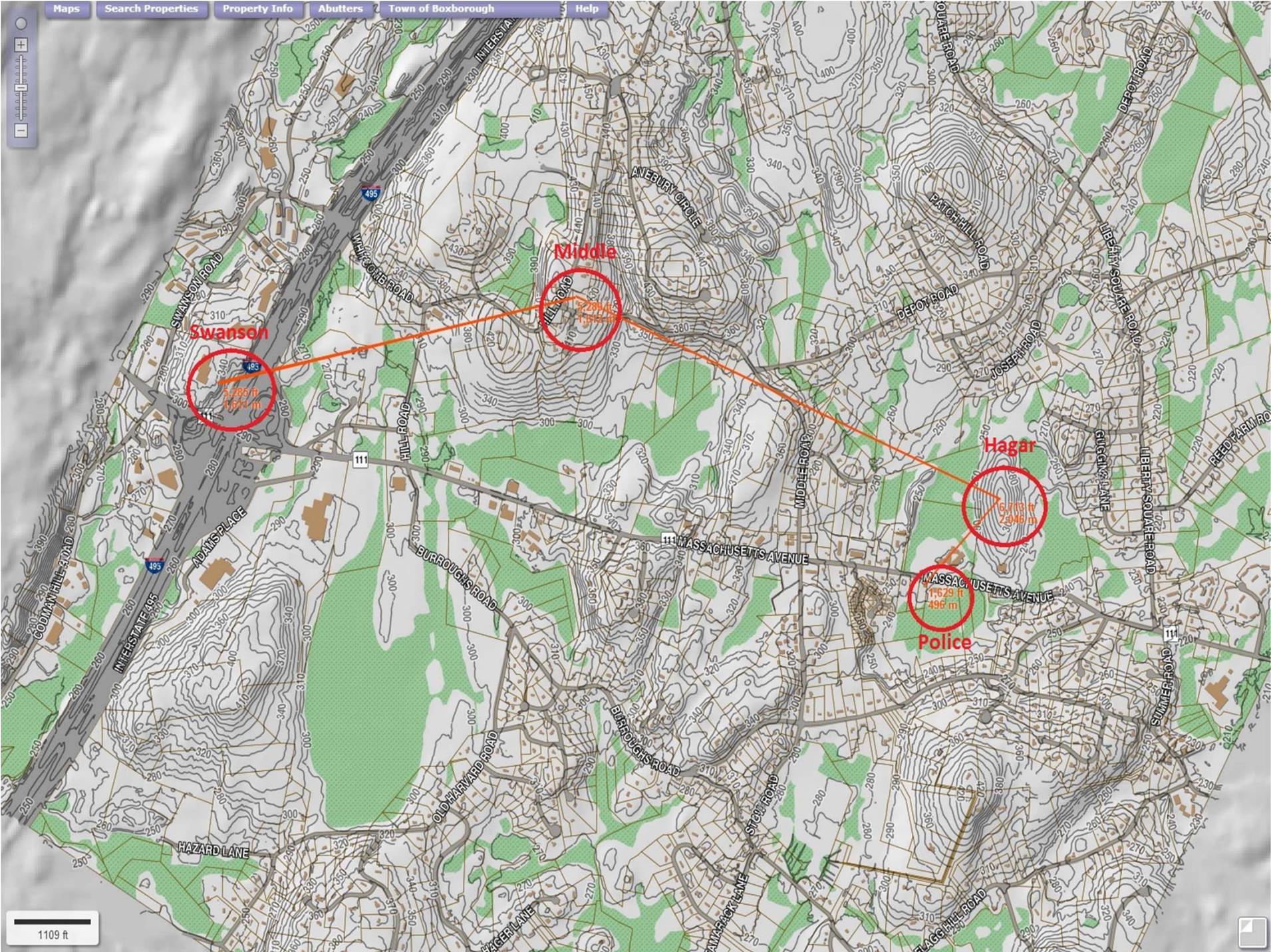
Lat: 42-29-19.4 N
Lon: 71-32-43.4 W
AMSL: 354 ft
Tower AGL: 49 ft

Profile Info

Distance: 1.00 mi
Bearing: 257.99 deg
of points: 200
K value: 1.333
Frequency: 4900
Clearance: 0.6

Losses

Base Loss: 110.4 dB
Fade Margin: 47.6 dB
Diffraction: 0.0 dB
Fresnel: 0.0 dB



Middle Road to Hager Cell Tower



Middle Road to 85 Swanson Road



Budgetary Costs

• 2 Position Dispatch Console	\$90,000.00
• 6 Simulcast Transmitters	\$110,000.00
• 4 Point to Point Radios w/ MUX	\$98,000.00
• 2 JPS Raytheon Voters	\$17,000.00
• Hardware, Cables, Antennas	\$25,000.00
• Installation	\$58,500.00
• DPW 12 Radios	\$13,500.00
 Project Total	 \$412,000.00

DPW Option

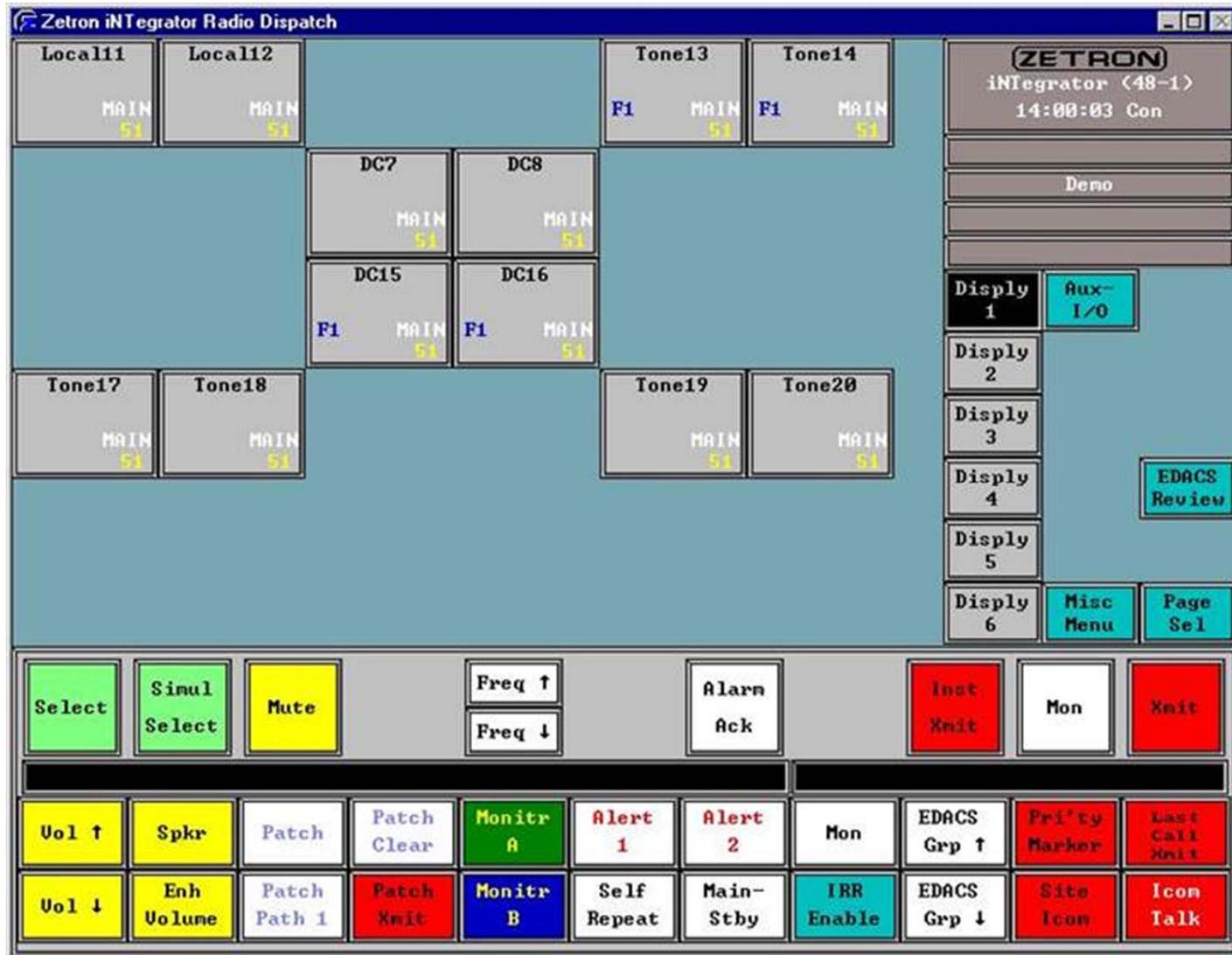
Middle Road

- Cost involved in developing Middle Road site is not included in the budgetary pricing.
- Acquisition of a pole and installation.
- Trenching under ground service to building.
- Remodel or electrical work needed in basement of building.

New Dispatch Console

- Current model fully supported by manufacturer.
- Hot standby on critical components.
- Cross Band Patch solves Interoperability issue as Police, Fire and DPW can be connected or patched together to communicate as required.
- Remote I/O door controls, monitoring etc.
- Multiple Dispatcher operation with status indication.
- Battery back up, no need for Uninterruptible Power Supply (UPS).

Zetron Integrator RD console



Equipment Life Expectancy

- Solid State Electronics
 - 15 to 20 years normal usage.
- Maintenance Items
 - Computer CRT, Keyboards, Antennas
- Warranty
 - All equipment covered by manufacturer for 1 or 2 years against manufacturing defects.
- Acts of God, Vandalism, Accidents
 - Equipment should be listed with towns insurance carrier.

Construction in Phases over 5 years

- **Pros**

- Capital investment over time.

- **Cons**

- Radio system will take 5 years years to complete.
- Cost increases.
- Potential safety issues for Police Officers, Fire Fighters and citizens of the town do to an incomplete radio system.

That Concludes the Presentation

Thank You