Town of Ayer

Radio System Improvement Project

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What and Why?

• What: A proposed project for improvement of the current Ayer Police Dept. radio system, with benefits to Ayer FD and Ayer DPW

• Why: Officer and Citizen Safety
  – Over the past several years there have been multiple instances of officers unable to communicate during various incidents
  – Radio coverage at Nashoba Hospital is unreliable, yet we are called there regularly
  – Ayer has a number of unique high profile targets: rail yards, major electrical substation, grain elevators
  – The current system is quite old and reliability/security is poor:
    • Inadequate shelter building
    • Lack of standby generator
    • Lack of shelter alarms
    • Damaged fencing
What Problems are We Trying to Solve?

1. Poor talk-in outdoor coverage (from portable to dispatch)

2. Poor talk-in coverage inside buildings, e.g. Nashoba Hospital (from portables to dispatch)

3. Improve overall system reliability

4. Ensure talk-out outdoor coverage (from dispatch to portables) remains good
System Reliability & Coverage Concerns

• Ayer has multiple disaster/threat targets (major power substations, rail yards, grain elevators)

• Today a long term power outage should be a consideration for all public safety agencies (cyber attack on the power grid, Hurricane Sandy, etc.)

• Multiple warehouses with poor to no inside coverage from portable radios

• Poor in-building coverage at Nashoba Valley Hospital
Current Ayer Radio Site Issues

Hilltop School Site Issues:
- Wooden shed
  - Unheated
  - Not vandal or bullet proof
  - Vermin

- No generator backup

- Antenna
  - Not high above trees
  - Much of the energy is going to the horizon (not useful for local coverage)

- No site alarms for entry, fire, low temp, etc.

- Grounding uncertain (lightning & safety)
Current Site Conditions

- PD repeaters
- Backup Batteries
- Undersized, long grounds not per NEC or R56
- FD Repeater
Proposed Project

These various improvements will improve coverage from portable radios and improve security & reliability:

1. **SHELTER:** (Benefits PD, FD, DPW) concrete vermin proof, bullet resistant shelter for all PD, FD repeater or base stations, at the current Hilltop School site. A used shelter in good condition has been found at *1/3 price of new.*
   (Note: Shelter already paid for in current operating budget)

2. **POWER:** (Benefits PD & FD)
   A. Provide a standby generator to power all equip.
   B. Provide receptacle to allow a ‘roll up’ generator to power the shelter during very long periods of power outage (Katrina, Sandy)
   C. Centralize DC backup batteries

3. **ALARMS:** (Benefits PD & FD) Provide site alarms (door entry, fire, too hot or cold in shelter, generator, etc.) that notify PD Dispatch of problems
Proposed Project

4. RAISE ANTENNA: (Benefits PD & FD) Install a new 100+ foot tower for all PD and FD antennas to get them off of the water tank.

5. VOTING RECEIVERS: (Benefits PD, plus FD- for radio fire alarm repeater on towns’ east side) Provide remote receivers at the east and west ends of the town, to improve communications into Dispatch from PD portables. The central site will “vote” the best signal and repeat it to all users and Dispatch. Those remote receivers will be ‘off the grid’ using solar power.

6. LINKS TO RECEIVER SITES AND PD HQ: (PD HQ link benefits PD & FD) Provide microwave links (small dish antennas) to connect the two remote receiver sites to the Hilltop School site...
Proposed Project

7. MOVE RADIOS: (Benefits PD & FD) Move PD and FD radio repeaters/base stations to new shelter. PD primary channel will have a voter to choose best signal from 3 receivers. FD will continue to use existing equipment.

8. NASHOBA HOSPITAL COVERAGE: (Benefits PD and FD-depending on solution chosen)
Provide a system to improve coverage specifically within Nashoba Hospital.

9. CHAIN LINK FENCE: (Benefits PD, FD, DPW)
Repair portions of the chain link fence around the site, improving security for both the water tank, and the radio systems for PD and FD.
Possible Project Timeline Phase I*

SCOPE: Shelter, generator, tower, replace 2 ants and all coax lines, common battery system, SCADA alarm system to PD HQ, passive in-building system for Nashoba Hospital

- **SEPT 2016:** Ayer DPW is awarding a bid they put out to remove the 2 old water tanks from the site, using existing funds.

- **OCT:**
  - Water tower takedown is expected to be completed by mid Oct.
  - If the BOS and Town approve the budget, we would issue an RFP in late October for the radio system

- **DEC:**
  - Radio system RFP award for Phase I mid December
  - Tower, generator foundations would be poured before Christmas

- **JAN & FEB 2017:** Tower, shelter, generator, base and repeater radios moved

- **MAR & APR:** Drive testing, system testing, acceptance, and turnover Phase I

*Notes:
- subject to RFP winner’s final schedule
- Phase I to be voted upon at October 2016 Town Meeting
Possible Project Timeline Phase II*

SCOPE: PD voting receivers east and west of town, 1 60’ tower to the west, microwave links and SCADA alarms to both remote sites, solar power for remote sites to include FD radio fire alarm repeater at east site

• May 2017:
  – Obtain town approval for Phase II
  – Award Ph II work to same vendor as Ph I (vendor picked on overall best value for both phases)

• Summer 2017:
  – Install voting receivers, solar systems, masts at east & west sites, 3 microwave links

• Summer 2017: Drive testing, system testing, acceptance, and turnover for Phase II

*Notes:
- subject to RFP winner’s final schedule
- Phase II to be voted upon at April 2017
To Save on Cost

• We are not replacing any repeater or base stations at the central Hilltop School site
  – We are only adding 2 voting receivers and a voter for PD

• We are not moving PD to P25 digital technology; all depts. stay on analog conventional (non-trunked) operation

• No user radios (mobiles or portables) are being replaced
Cost Budget Estimates *

• Estimate for Procurement, Installation, Testing of Radio System:
  – Phase I:  $222,066
  – Phase II: $166,793

• Equipment Maintenance Phases I & II:
  – TBD based on RFP bids
  – Estimated to be $20-45,000/year

* Note these are estimates; vendors will respond to the RFP with their pricing
Summary

• Current system is not providing PD coverage in key areas (Note-FD is not having problems)

• Overall reliability, security concerns for both PD and FD systems

• Improved sharing of town assets among PD, FD, DPW is inherent in this project

• Concrete shelter, alarms, new tower, generator, new PD voting receivers will fix these issues

• Need BOS concurrence to go forward at Town Meeting to request the project funds for Phase I
Questions?
BACKUP INFORMATION
Current Ayer VHF System Diagram

Hilltop School Site

- Alpha Ch. Repeater
- Charlie Ch. Repeater
- FD Repeater

DC Batteries
Proposed Ayer PD VHF System Diagram

- Solar Panel for receiver & MW power
- Microwave Link
- Alpha Ch. Voting Receiver
- Alpha Ch. Repeater
- Receive Voter
- Alpha Ch. Voting Receiver
- Microwave Link
- Solar Panel

Best audio from the 3 receivers is re-transmitted
FD Communications

- FD repeater moved to new shelter
- FD repeater will be on backup generator/rollup generator
- FD antenna to be moved to new 100’ tower
- If passive in-building systems are installed at hospital or warehouses, FD will also benefit
- If active in-building systems are installed at hospital or warehouses, FD will have to have their own BDA device at ~$41K each
- IF desired, FD could also put voting receivers at same sites as PD
  - Microwave links will handle the extra capacity
  - But solar cell/battery system will have to be increased