

San Jose Neighborhood CERT Communications Architecture & Operation - 2026

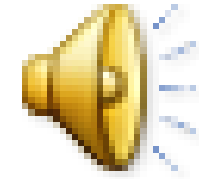
Training Session Presented at San Jose Fire Museum

by John Nourse

October 10, 2026



1989 Earthquake RACES Radio Traffic:



- This is actual RACES recording from the 1989 earthquake
- First person on the net is Net Control Operator, who starts a directed net
- Net control asks for damage updates – everyone with an update responds with their callsign
- NO one just started talking on the net – they waited for net control to call them to respond
- Net control requests the update from each responder in the order they were received
- The more experienced net control operator joins the net and accepts handoff
- A person calls in with an update, immediately followed by someone with an emergency
- **Net control handles the emergency first.**



City-Wide Disaster Effects:

- Could affect one million neighbors over 181 square miles
- All cell phone service could be lost
- 9-1-1 service could be lost
- No Google or AI agents available for advice

SJN CERT Capabilities:

- Light Search & Rescue
- Trained First Aid Response
- Small Fire Suppression
- Transportation
- **Emergency Voice & Data Communications Service**

Communications Service Areas:

- 350 Neighborhood ICP's @ 0.5 sq. mi. (0.7 mi. x 0.7 mi.)
- 72 Zone ICP's @ 2.5 sq. mi. (1.6 mi. x 1.6 mi.)
- 12 Area ICP's @ 15 sq. mi. (3.9 mi. x 3.9 mi.)



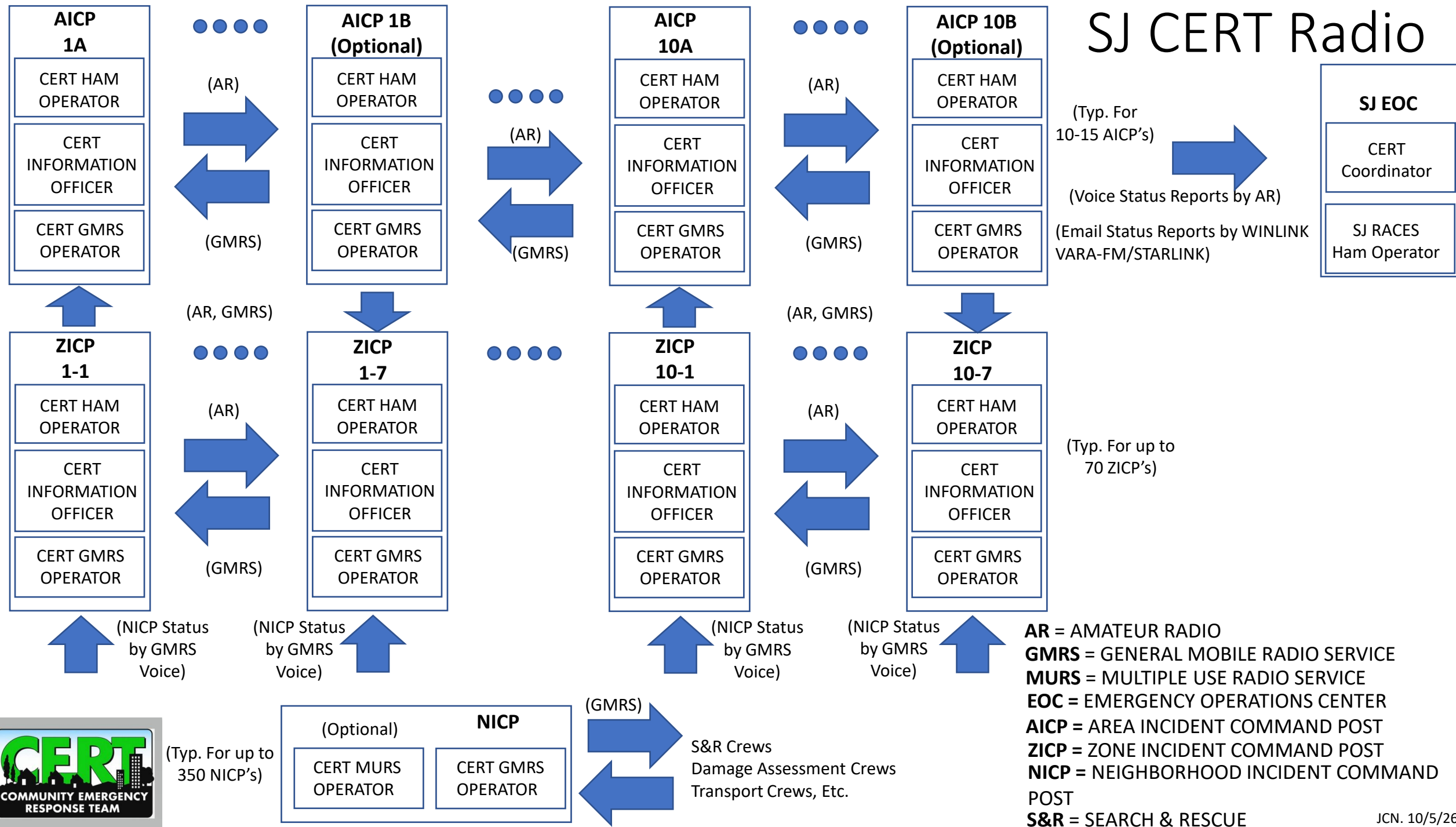
Technologies:

- Amateur Radio (Voice + Data)
- GMRS Radio (Voice Only)
- Starlink (Data + VOIP Voice)
- Meshcore (Text Only)

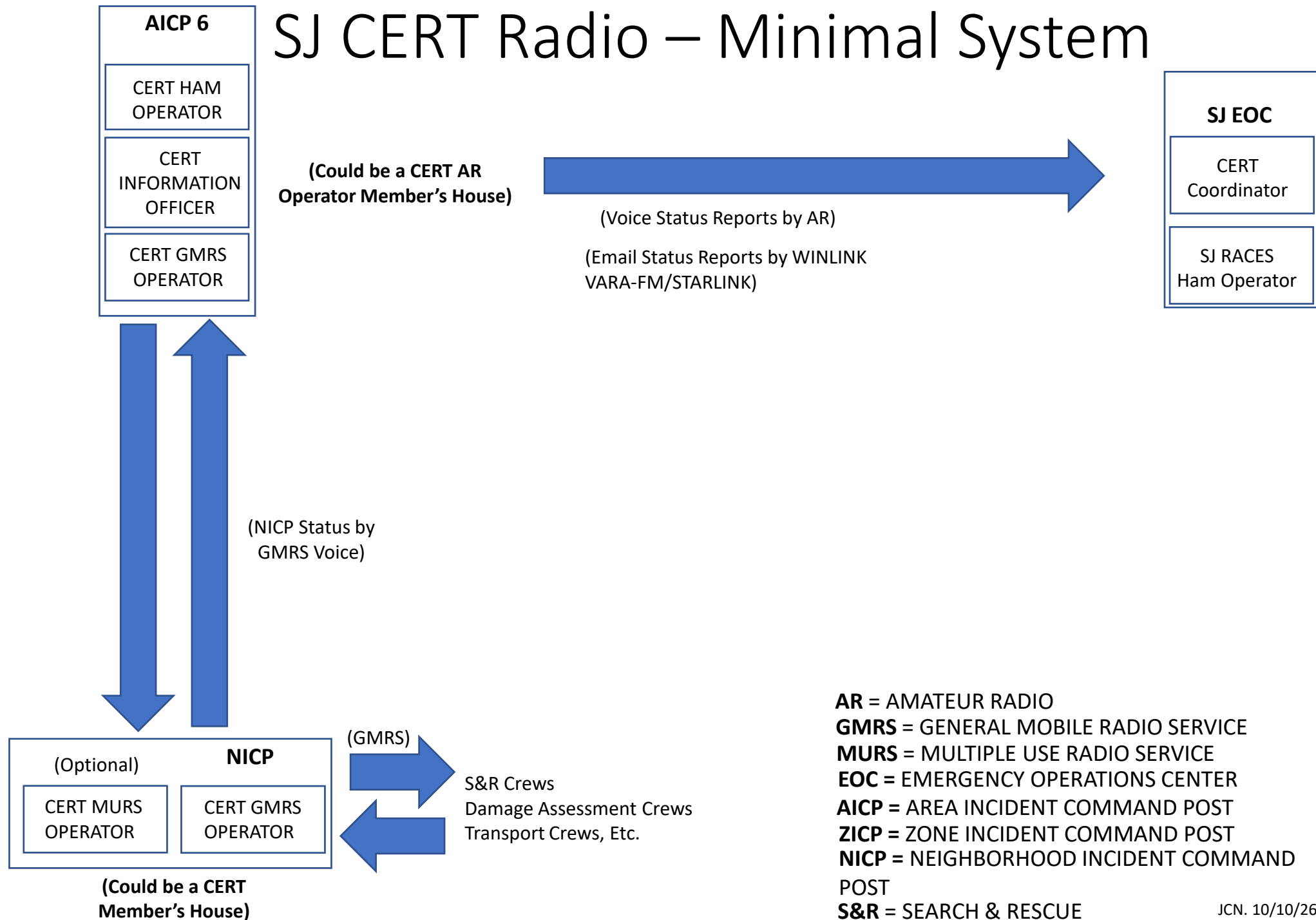
Principles Followed:

- Do the most good for the most people
- Limit Span of Supervision and Control to 5:1 at all levels
- Use best available technology (VARA-FM, Winlink, Starlink, MeshCore)
- Encourage Amateur Radio licensing
- Maintain a Standard Radio Channel & Equipment list
- Scalable System Architecture
- Use Directed Nets
- Have at least 2 GMRS and 2 Amateur Radio Repeaters for redundancy
- Practice with weekly check-in nets, quarterly field exercises
- Non-approved radio gear must be programmed by the user.

SJ CERT Radio



SJ CERT Radio – Minimal System





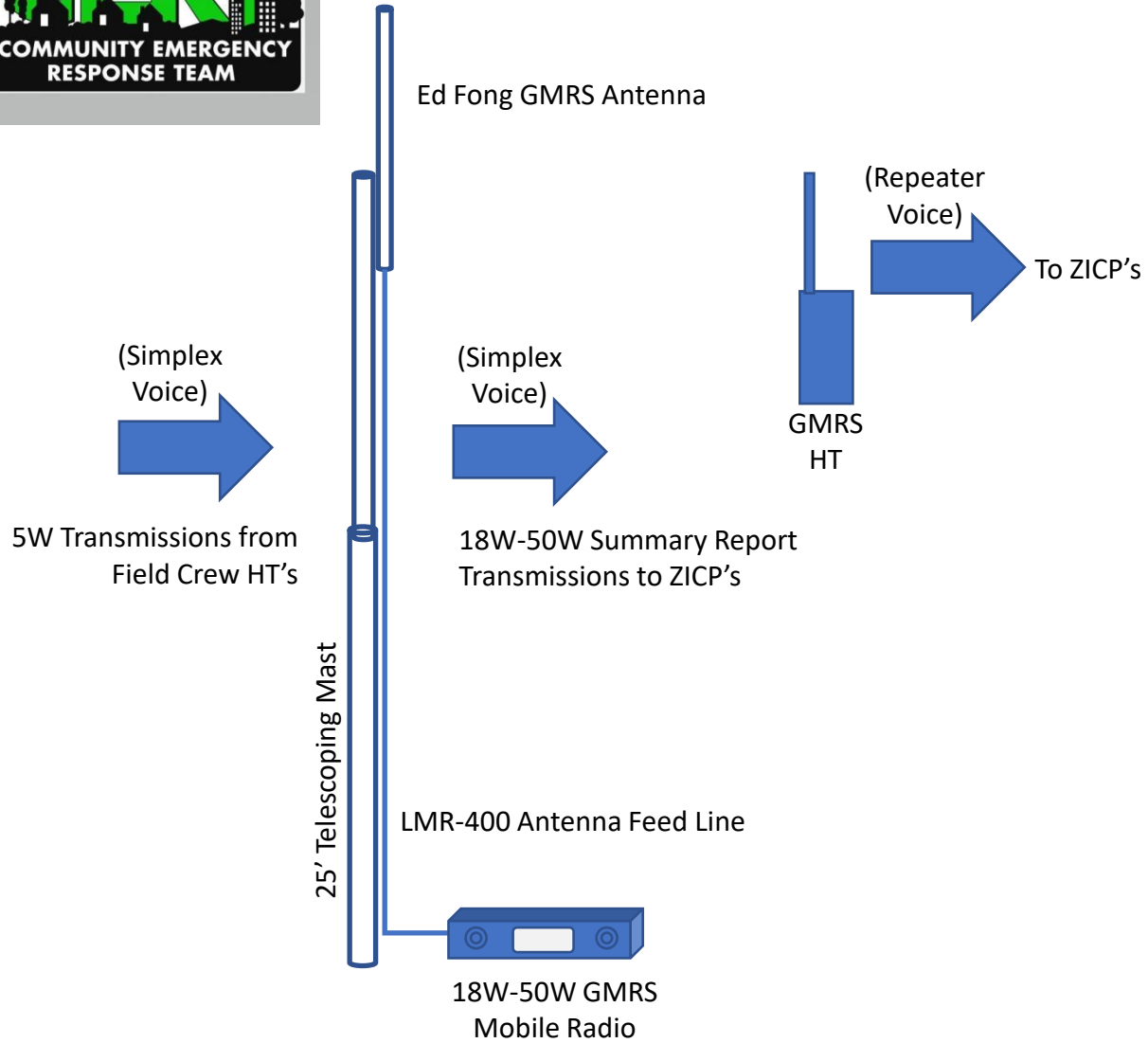
Area 6 Incident Command Posts

ZICP/AICP LOCATION		ZICP 1-1	ZICP 1-2	AICP 1A	ZICP 1-3	ZICP 1-4	AICP 1B	ZICP 1-5	ZICP 1-6	ZICP 1-7
N E I G H B O R H O O D I C P	Starbird Park	Harman Park	Rose Garden	St. Elizabeth Park	Branham Park	Branham Park	Branham Park	Branham Park	Branham Park	River Glen Park
	Valley Fair	O'Connor		Fruitdale	Mulberry			Lincoln Glen	N. Willow Glen	
	Monroe	Burbank		Sherman Oaks	Dry Creek			Briarwood	River Glen	Tamien
	Hamman Park	Rose Garden		Stokes	Willowvale			Kirk	River Glen	Guadalupe
	Valley Medical	Shasta/Hanchett		Southwest	Cherry			The Willows	Gardner	Canoas Garden
	Parkmoor	Richmond		Greylands	Willow Glen W.			Palmhaven	-	-
	Starbird	North Bascom		Greylands	Willow Glen W.			Lincoln Avenue	-	-

(PRELIMINARY!)

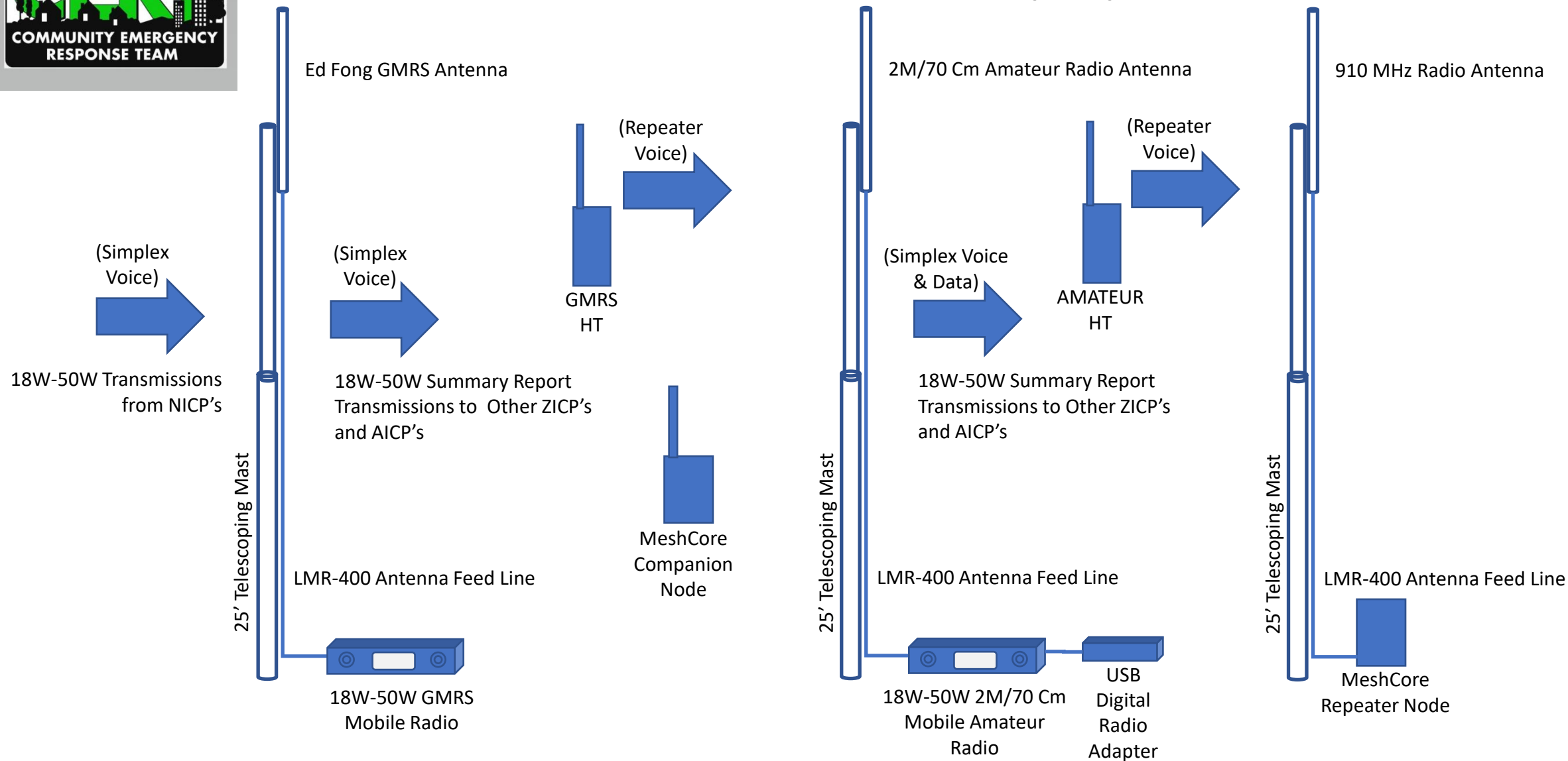


Neighborhood Incident Command Post Radio Equipment



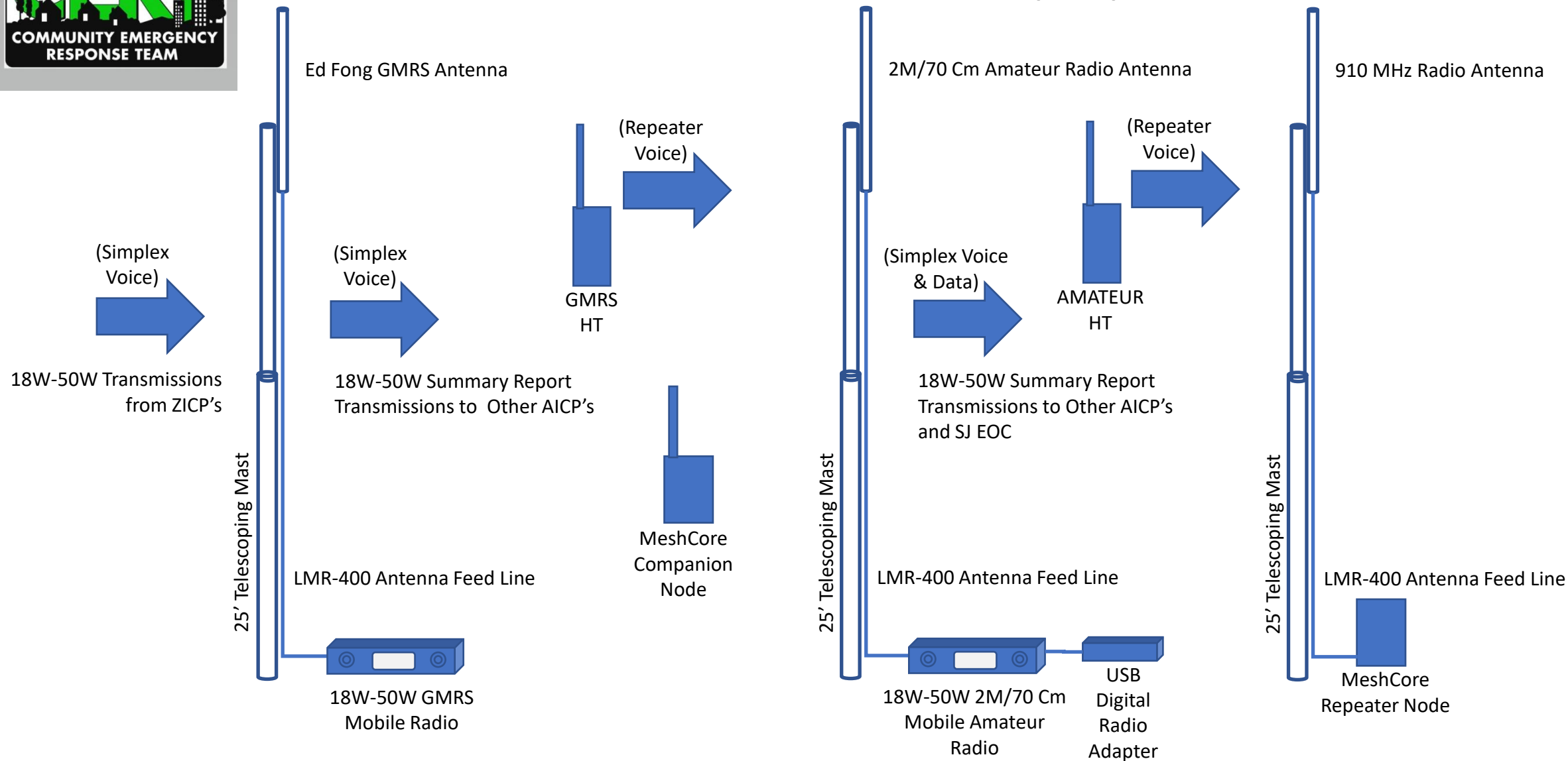


ZICP Radio Equipment



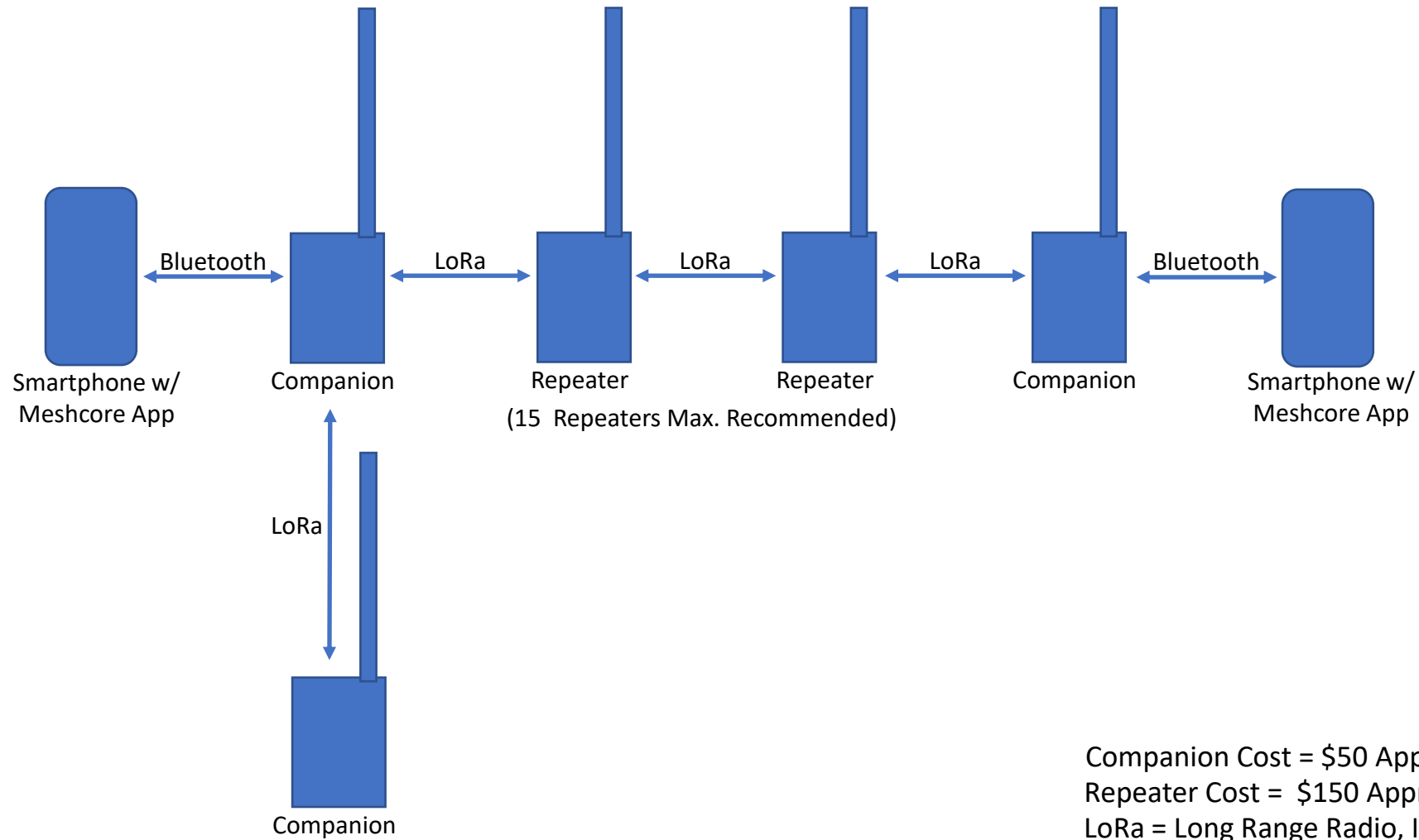


AICP Radio Equipment





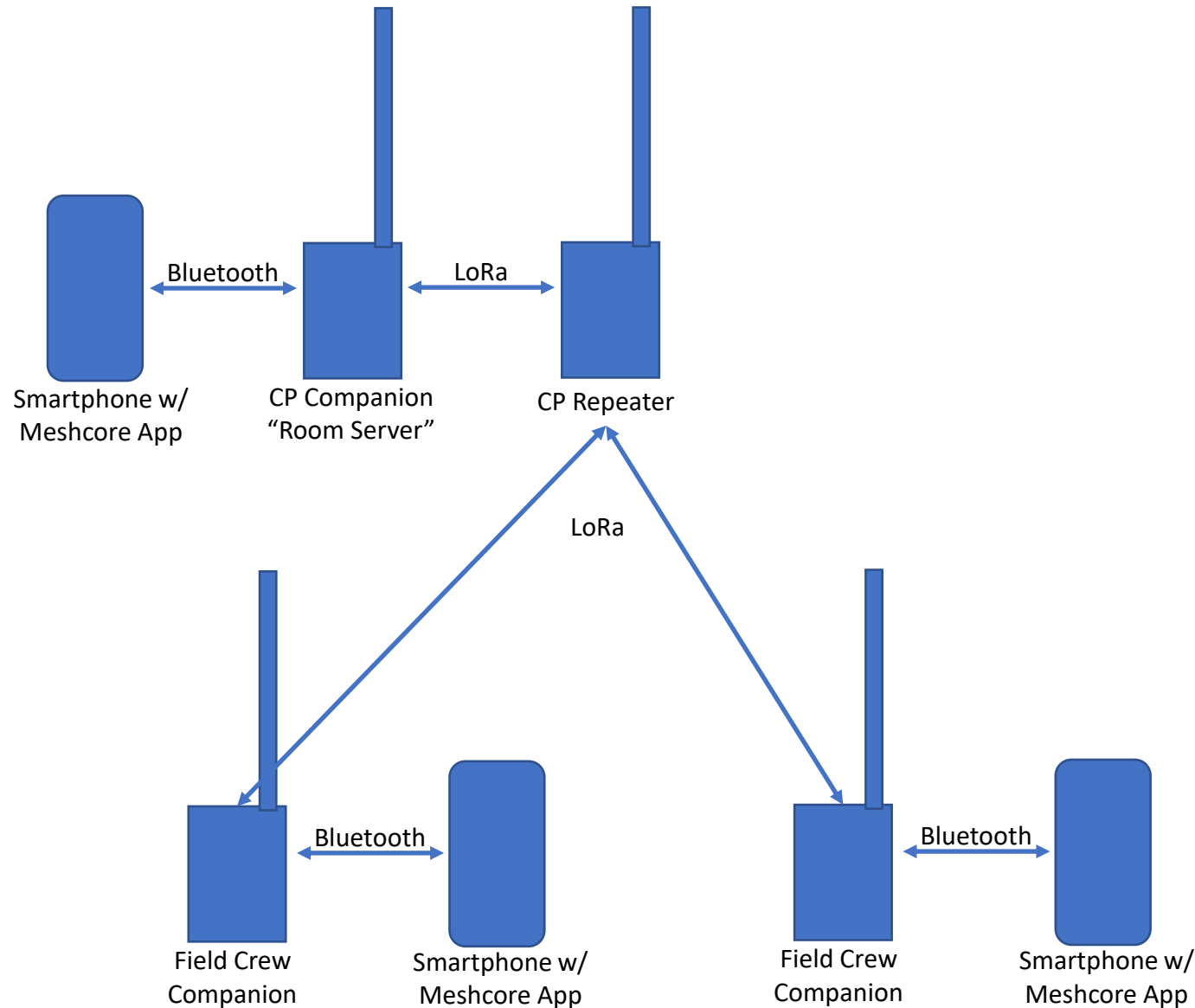
MeshCore Messaging Network Structure



Companion Cost = \$50 Approx.
Repeater Cost = \$150 Approx.
LoRa = Long Range Radio, ISM Band
Bluetooth = Short Range 2.4 MHz Band



CERT Command Post MeshCore Network



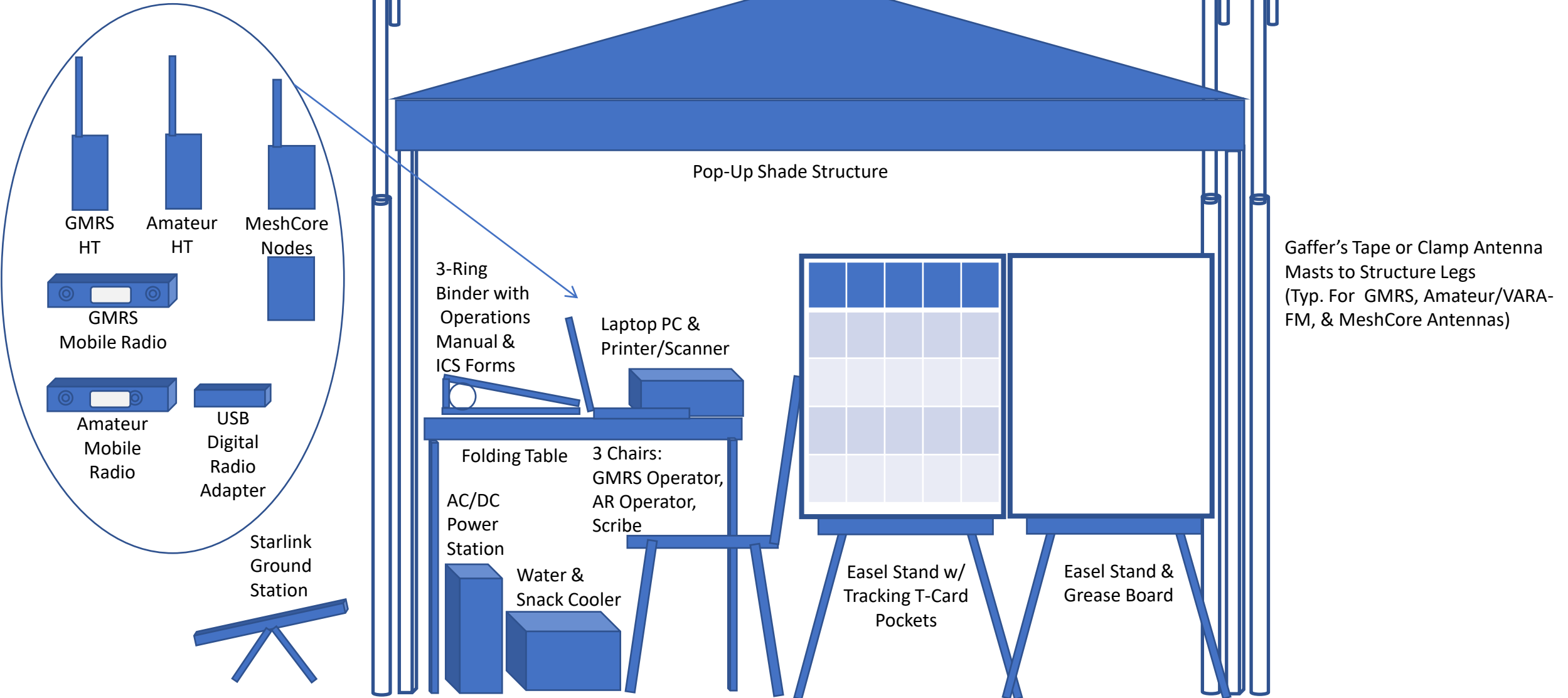
CP = Command Post

Room Server stores messages, and acts as a "Bulletin Board."

All Field Companions should be charged and linked to the Room Server ahead of time.



Typical Command Post Support Equipment





Example CERT Status Report Page Shared w/SJ EOC:

DISTRICT 6 CERT STATUS REPORT (SAMPLE)

DATE: 1/1/24 TIME: 0900

UNTREATED INJURIES:

Bramhall Park @ tennis courts - Thigh fracture adult female

TREATED, STABILIZED INJURIES:

4532 Willow Avenue - Broken arm, adult male

621 Minnesota Ave - Broken leg, 9YO female

PG&E POWER OUTAGES:

Willow Glen North - Willow Ave to Minnesota Ave

Willow Glen South - Curtner Ave to Camden Ave

Rose Garden - All north of Hwy 880

JapanTown, Northside, Little Portugal - ALL

Mineta Airport - ALL Terminals & parking

Westfield Mall, Santana Row

Good Sam Hospital - On Generator Backup since Dec 31.

SJWCo LINE RUPTURES:

675 Glen Una Way

78 Carolyn Way

Hamilton Ave @ Meridian Ave

SCVWD FLOODING SITES:

Coyote River @ Keyes

SCVWD RAW / TREATED WATER SITES:

Los Gatos Creek Near Lark Ave - Turnout Vault Flood

ADVISORY Leland HS, Camden Ave near Via Valiente - Possible Treatment Plant Chlorine Leak

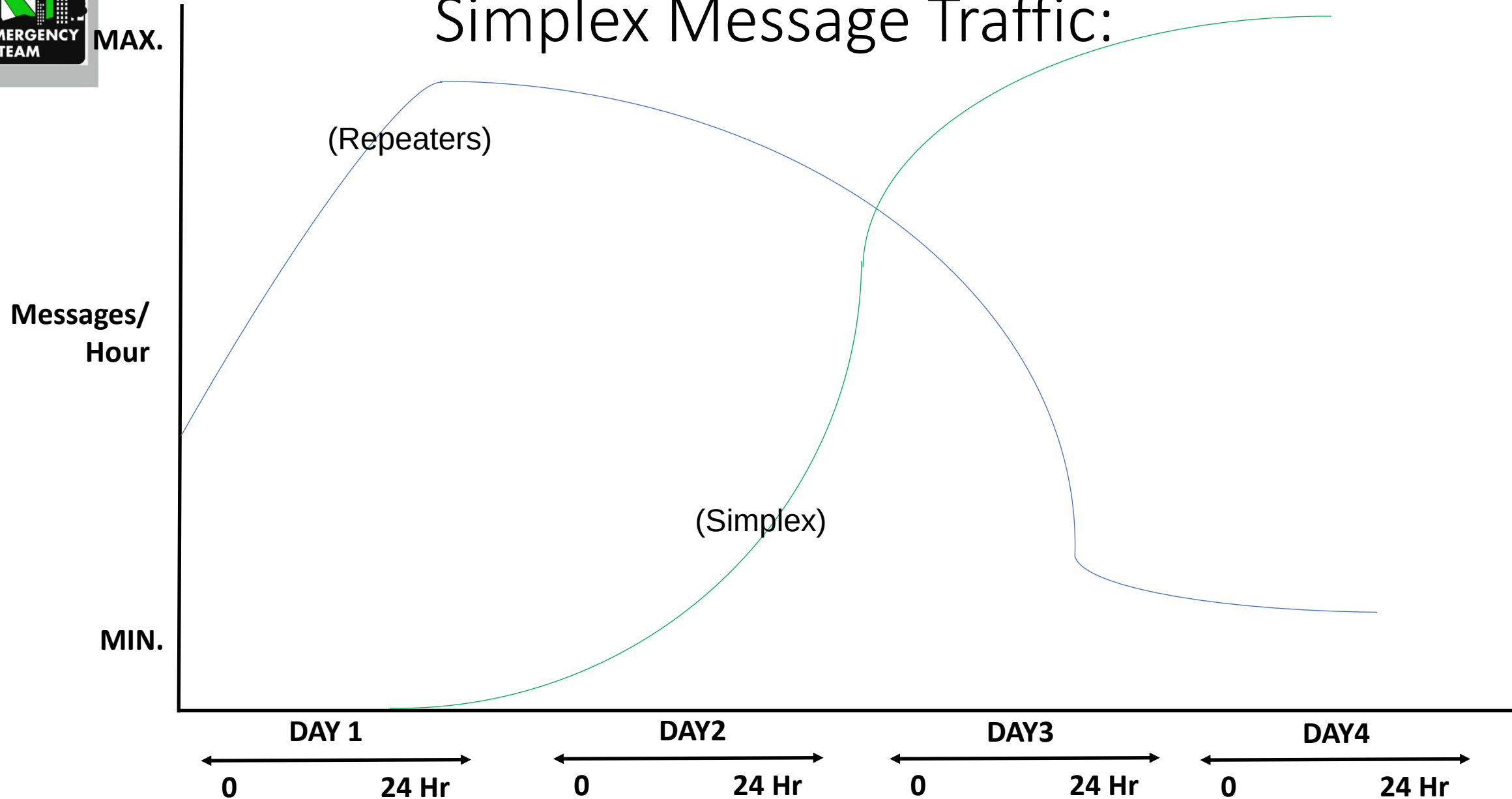


Radio Usage & Protocol:

- ❖ Practice checking in to the Tuesday evening nets. Co-Run a net!
- ❖ If you feel an earthquake, turn on your radio, tune in to the “Bandit” GMRS repeater. Start a check-in net, if no one else has done so.
- ❖ If “Bandit” repeater is down, use SJ CERT-1 repeater. Use SJ CERT-2 repeater if necessary.
- ❖ Carry a laminated “Mike-Mike” card in your wallet with damage scale numbers. Report your scale number on the net. (“Mike-Mike” is short for Modified Mercalli Scale).
- ❖ Learn ITU Phonetic alphabet and practice spelling random words daily. Practice your GMRS call sign using phonetics.
- ❖ Keep messages short. Think before you speak. Listen mostly.
- ❖ Wait to be activated by the City. (THIS PROCEDURE IS YET TO BE DETERMINED).

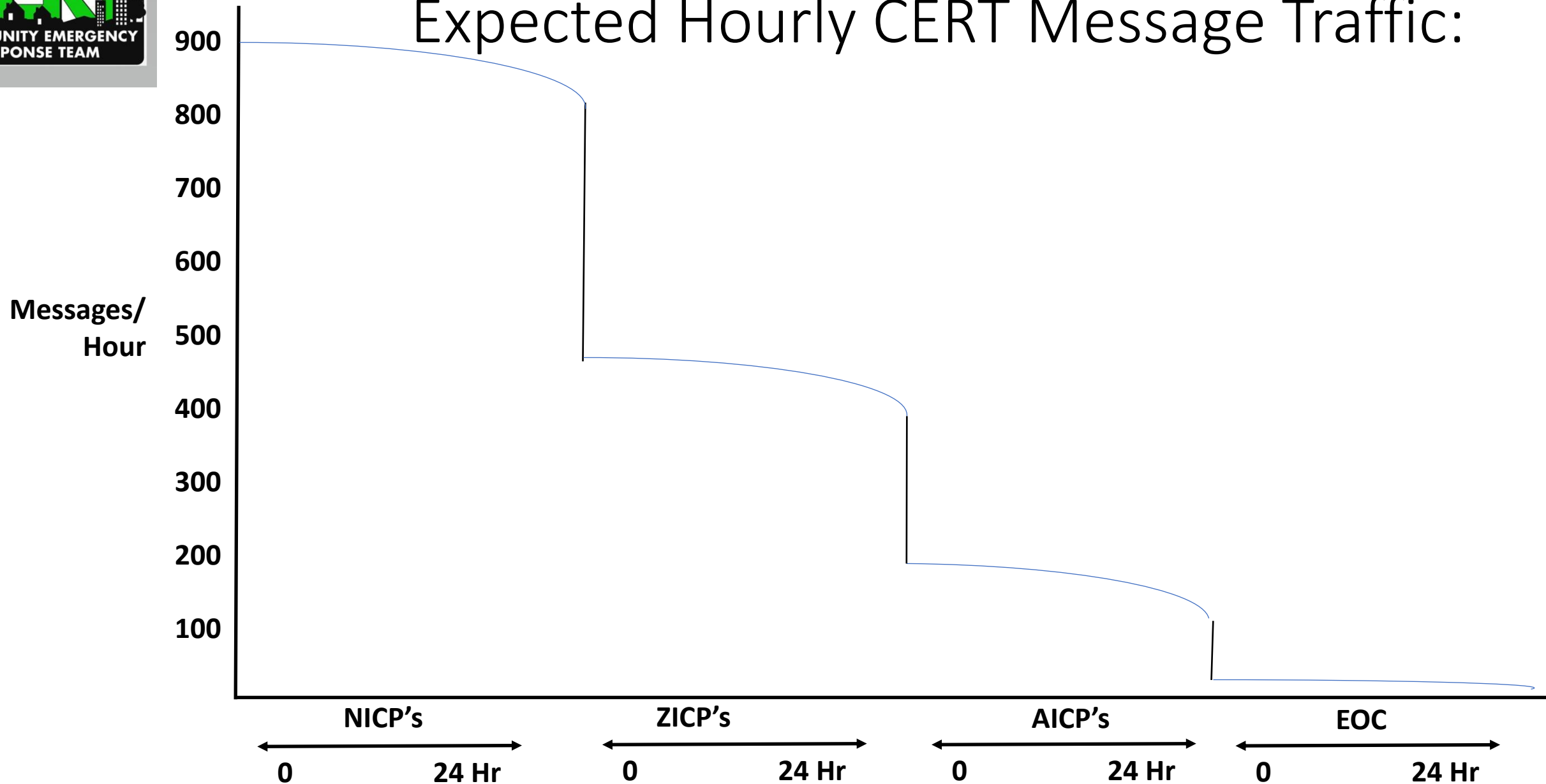


Expected CERT Radio Repeater Traffic vs. Simplex Message Traffic:





Initial Disaster Phase - Approximate Expected Hourly CERT Message Traffic:





CERT Radio Channel Usage:

RADIO SYSTEM	UNIQUE CHANNELS	MAX. 2-MINUTE MESSAGE CAPACITY***	WHERE USED	LIMITATIONS
GMRS Voice Repeater(s)	2	60/Hr	NICPs, FTs, ZICPs, AICPs, DDOs	1,5
GMRS Voice Simplex	7@5W, 8@50W	450/Hr	NICPs, FTs, ZICPs, AICPs, DDOs	2,5
W6UU, AI6EH Repeaters	2	60/Hr	NICPs, FTs, ZICPs, AICPs, DDOs, EOC	1,5
AR Voice Simplex	2	60/Hr	ZICPs, AICPs, DDOs, EOC	3,5
AR VARA FM Data*	3**	45/Hr	ZICPs, AICPs, DDOs, EOC	1,4,5

AR = Amateur Radio.

AICP = Area Incident Command Post

DDO = Disaster District Office.

EOC = Emergency Operations Center.

FT = Field Team.

GMRS = General Mobile Radio Service.

NICP = Neighborhood Incident Command Post

ZICP = Zone Incident Command Post

Total: 675/Hr
= 11.25/Min

1. One user at a time.
2. Requires relaying of messages.
3. Few available channels.
4. Not supported by OEM
5. Other users-Public & SCC-ARES-RACES channels.

* Winlink Emails, w/attached reports, message forms, photos, spreadsheets.

**AI6EH 2M, AI6EH 70CM, & KD6UCA Winlink RMS stations.

***1 Channel = Approximately 30 voice or 15 data messages/Hr average.



Monthly/Weekly Practice Nets

Occurance	Date	Time	Band	Repeater or Simplex
Monthly	2 nd Tues	6:30 PM	Ham	AI6EH Crossband Repeater, W6UU UHF Repeater
Weekly	Every Tues	6:40 PM	GMRS	AVCERT Repeater
Weekly	Every Tues	6:50 PM	GMRS	SJCERT1 or SJCERT2 Repeater
Weekly	Every Tues	7:00 PM	GMRS	BANDIT Repeater
Monthly	2 nd Tues	7:10 PM	GMRS	Simplex



Where Do We Go From Here?

- ❖ Invite SJ RACES to join CERT Exercises.
- ❖ Continue to encourage members to take amateur radio license “Ham Cram” classes.



REFERENCE MATERIAL ONLY



How Big an Area does a Zone Incident Command Post Cover?

San Jose = 181 Square Miles, with about 350 Neighborhoods

$350 \text{ Neighborhoods} / 181 \text{ Sq. Mi} = 1 \text{ Neighborhood} / 0.5 \text{ Sq. Mi. approximately}$

Recommended Span of Control for Supervision = 5 to 7 Neighborhoods per Zone ICP

Using 5 Neighborhoods/Zone ICP yields 2.5 Sq. Mi. per Zone ICP = 1.58 Mi x 1.58 Mi each

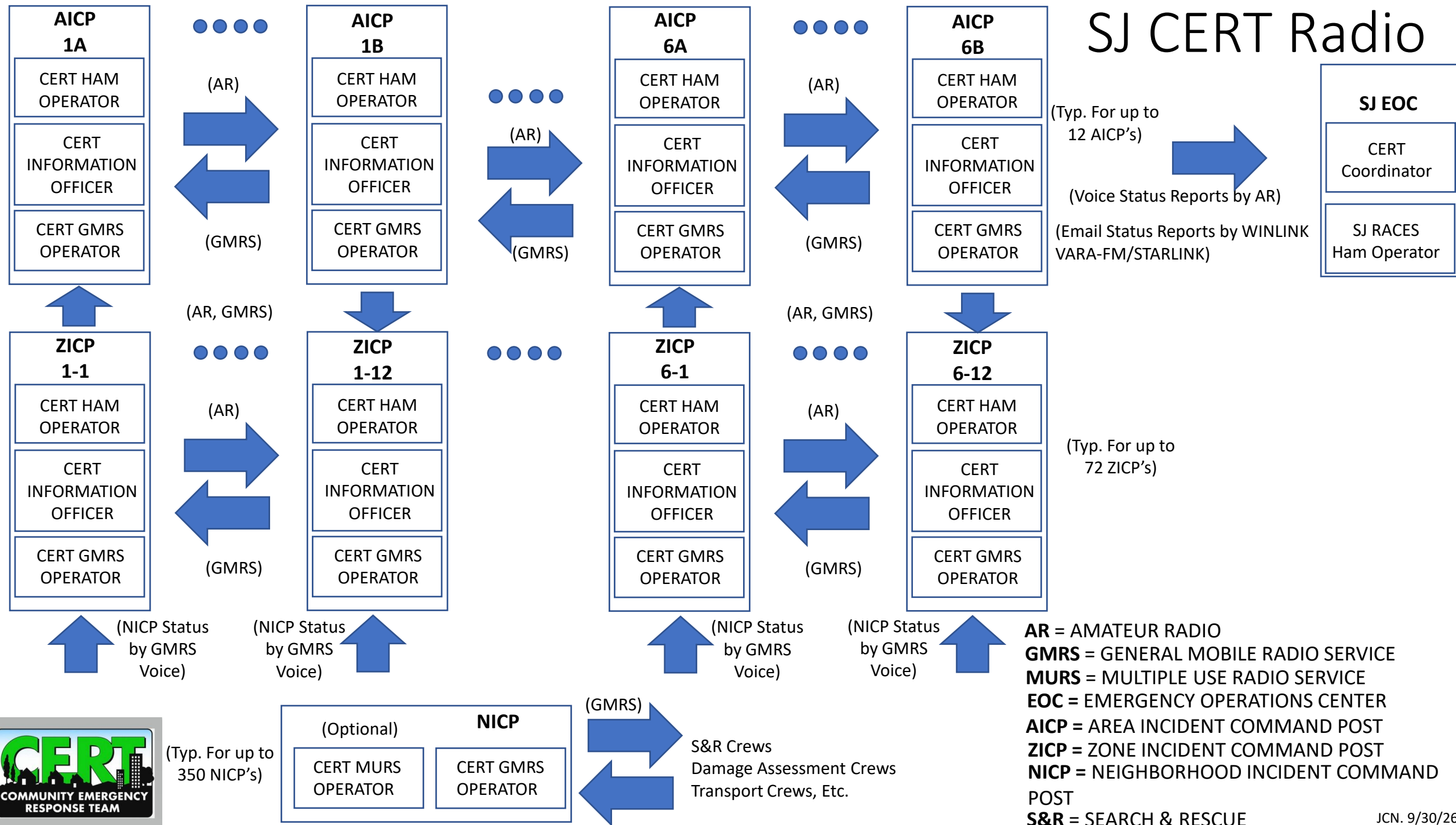
How Many Zone Incident Command Posts are Needed?

San Jose has 6 Battalion Fire Zones

$181 \text{ Sq. Mi.} / 6 \text{ Zones} = 30 \text{ Sq. Mi.} / \text{Battalion Fire Zone approximately} = 5.5 \text{ Mi.} \times 5.5 \text{ Mi. each}$

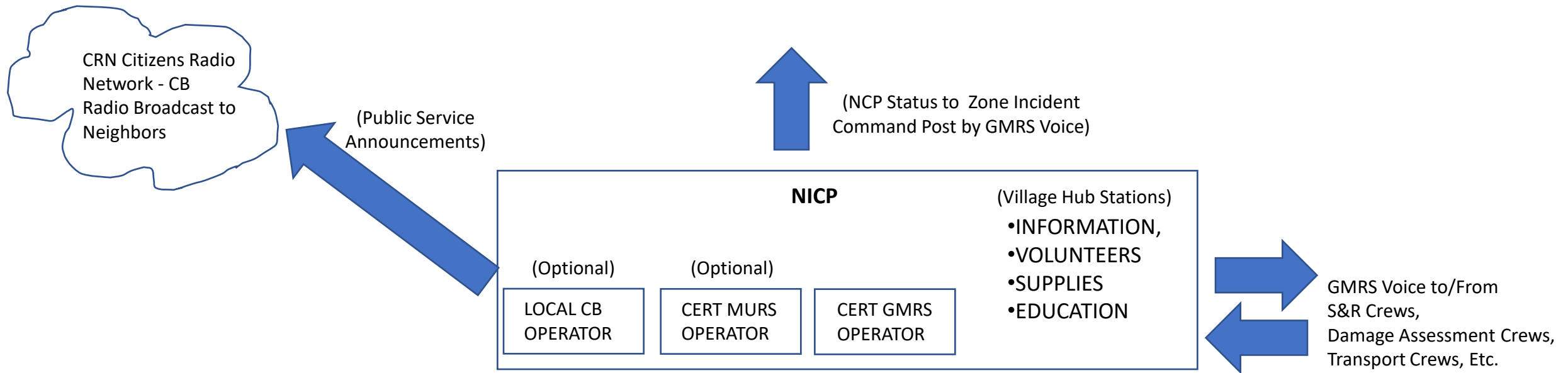
$30 / 2.5 \text{ Sq. Mi.} / \text{Zone ICP} = 12 \text{ Zone ICP's per Battalion Fire Zone}$

SJ CERT Radio





SJ CERT Radio Communications- Neighborhood Incident Command Post



NICP = NEIGHBORHOOD INCIDENT COMMAND POST
S&R = SEARCH & RESCUE

Area 1 Incident Command Posts

	ZICP 1-1	ZICP 1-2	AICP 1A	ZICP 1-3	ZICP 1-4	ZICP 1-5	ZICP 1-6	ZICP 1-7	ZICP 1-8	AICP 1B	ZICP 1-9	ZICP 1-10	ZICP 1-11	ZICP 1-12
LOC.	Calabazas Park	Rainbow Park	Mur-dock Park	Murdock Park	Hathaway Park	Starbird Park	Harman Park	St. Elizabeth Park	Branham Park	Bran-ham Park	Branham Park	Branham Park	Branham Park	River Glen Park
FS	FS 10.15			FS 10.14		FS 10.10		FS 10.4				FS 10.6		FS 10.37
N	Calabazas	Stevens Creek		Winchester	Baker West	Valley Fair	O'Connor	Fruitdale	Mulberry		Lincoln Glen	The Willows	N. Willow Glen	Gardner
E	Murdock	Strawberry Park		Cypress	Winchester Lynnhaven	Monroe	Burbank	Sherman Oaks	Dry Creek		Briar-wood	Palm-haven	River Glen	Tamien
I	-	Mitty		Blackford	Cadillac Winchester	Hamman Park	Rose Garden	Stokes	Willow-vale		Kirk	Lincoln Avenue	River Glen	Guadalup e
G	-	Rogers		Country Lane	Westgate Village	Valley Medical	Shasta/Hanchett	South-west	Cherry		-	-	-	Canoas Garden
B	-	English Estates		Moreland West	Forest Hill	Parkmoor	Richmond	Grey-lands	Willow Glen W.		-	-	-	-
O	-	-		San Tomas West	San Tomas Park	Starbird	North Bascom	Grey-lands	Willow Glen W.		-	-	-	-
R														
H														
O														
O														
D														
S														

(PRELIMINARY!)





Initial Emergency Development Stages:

❖ INITIAL ALERT STAGE.

Any CERT member announces emergency condition, and starts a check-in net using HT on first available GMRS repeater

❖ IMMEDIATE LIFE SAFETY ASSESSMENT

Self, Family, Neighbors. Triage/Categorize Red (Immediate)/Yellow (Delayed)/Green (Minor)/Blue (Gravely Injured)

❖ CRITICAL INFRASTRUCTURE DAMAGE ASSESSMENT.

Roads, bridges, railways, pipelines, utility poles.

Gather observations from neighborhoods during check-in net.



Initial Emergency Development Stages (Cont'd):

❖ SUPERVISORY LEADERSHIP ASSIGNMENTS STAGE.

CERT leadership names and GMRS call signs are listed as volunteers check into GMRS net. Includes Incident Commander, Planning Officer, Operations Officer, Logistics Officer. Planning Officer determines actionable intelligence from field teams.

Form Used: ICS 201 Incident Briefing, filled out by Planning Officer.

❖ NCP LEADERSHIP & FIELD TEAMS ASSIGNMENTS STAGE.

Names and GMRS call signs are listed as volunteers check into GMRS net. Includes Local Command Post Leader, Base Radio Operator, Scribe, S&R Leader, Damage Assessment Leader, Transport Leader.

Form Used: ICS 201 Incident Briefing, filled out by CP Leader



Activation vs. Good Samaritan Operations

❖ ACTIVATION BY SJ OEM.

Use ICS 201 prepared by SJ OEM Planning.
Insurance coverage provided by City of SJ

❖ GOOD SAMARITAN OPERATIONS.

Use ICS 201 prepared by SJ CERT Planning.
Insurance coverage provided by volunteer



Ongoing Emergency Development Stages:

❖ ACTIVE DEPLOYMENT STAGE.

CERT volunteers operate in shifts, documenting all activities, sending reports to supervisory leaders. All volunteers are tracked. Unit and communication logs are collected daily.

Use simplex GMRS radio channels within the 6 Areas, GMRS repeater for Inter-Area radio traffic. Use Amateur radio for EOC/DDO voice traffic). Use Amateur radio with VARA-FM , or use Starlink for Winlink data traffic.

Forms Used:

ICS 211 Check-in List

ICS 214 Unit Log

ICS 314 Windshield Damage Survey

ICS 213 Message Form

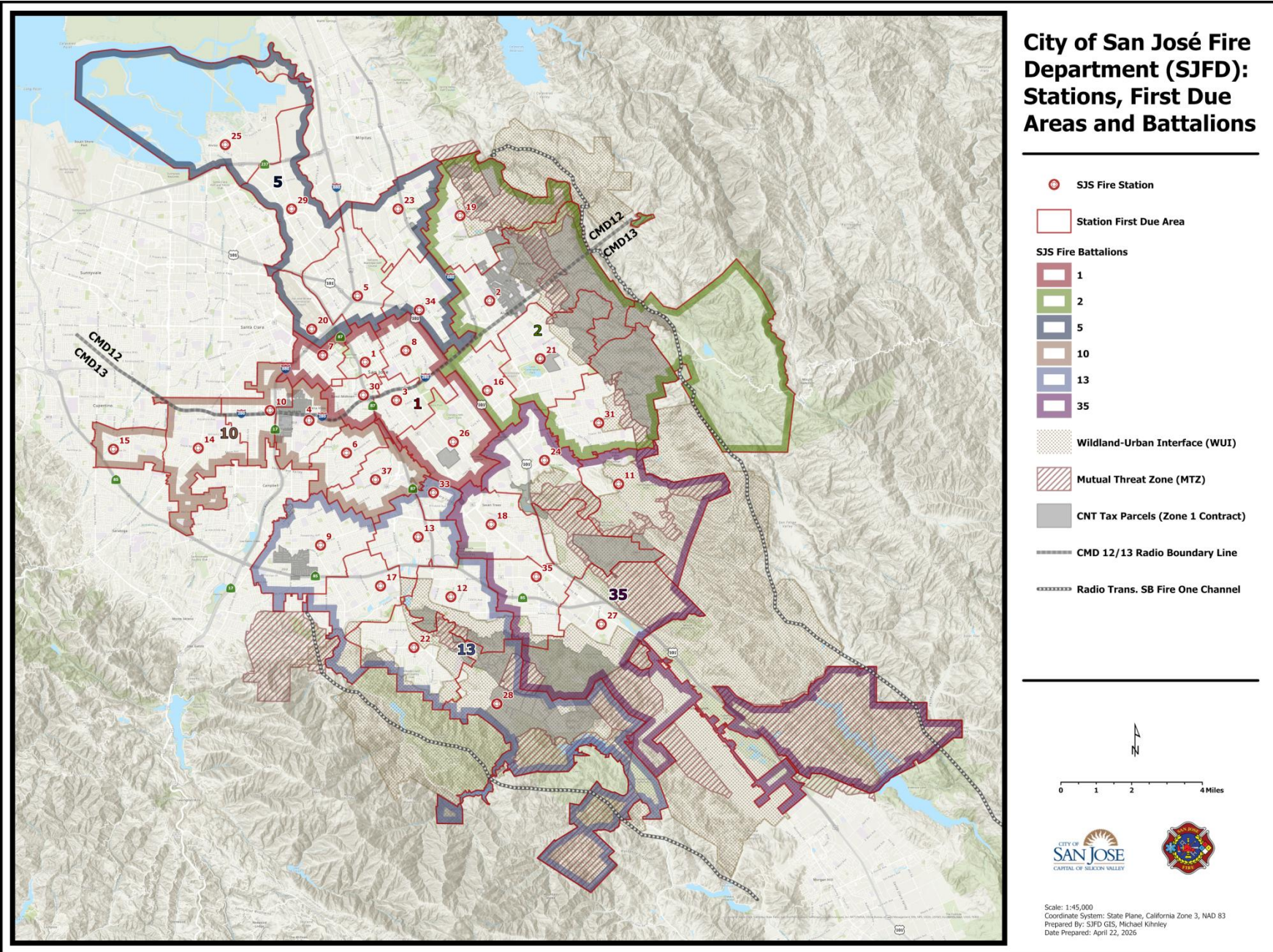
❖ DEMOBILIZATION.

CERT volunteers are discharged as resources are no longer needed.

Form Used: After Action Report

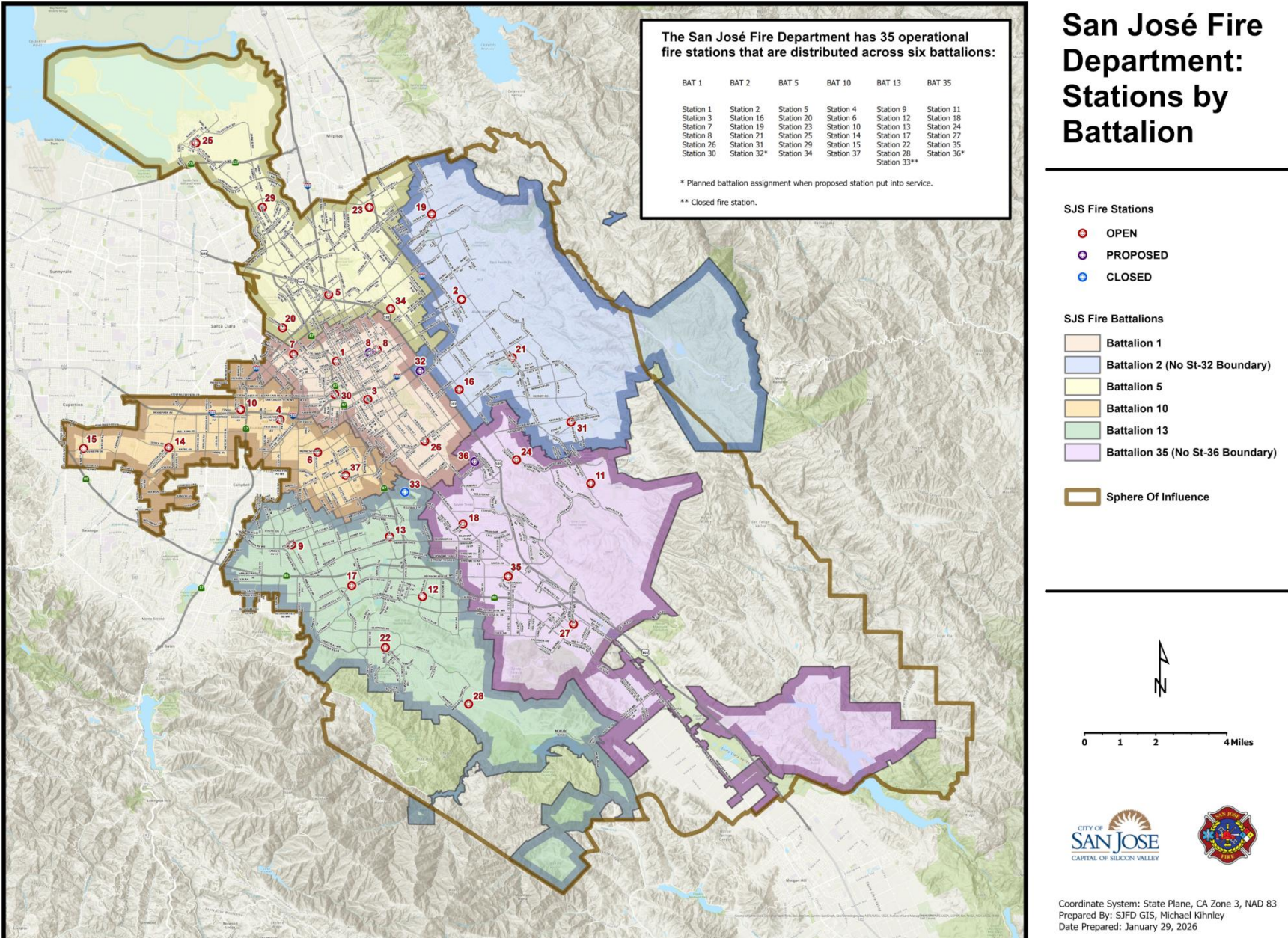


San Jose Fire Dept Battalion Map-Numbered:



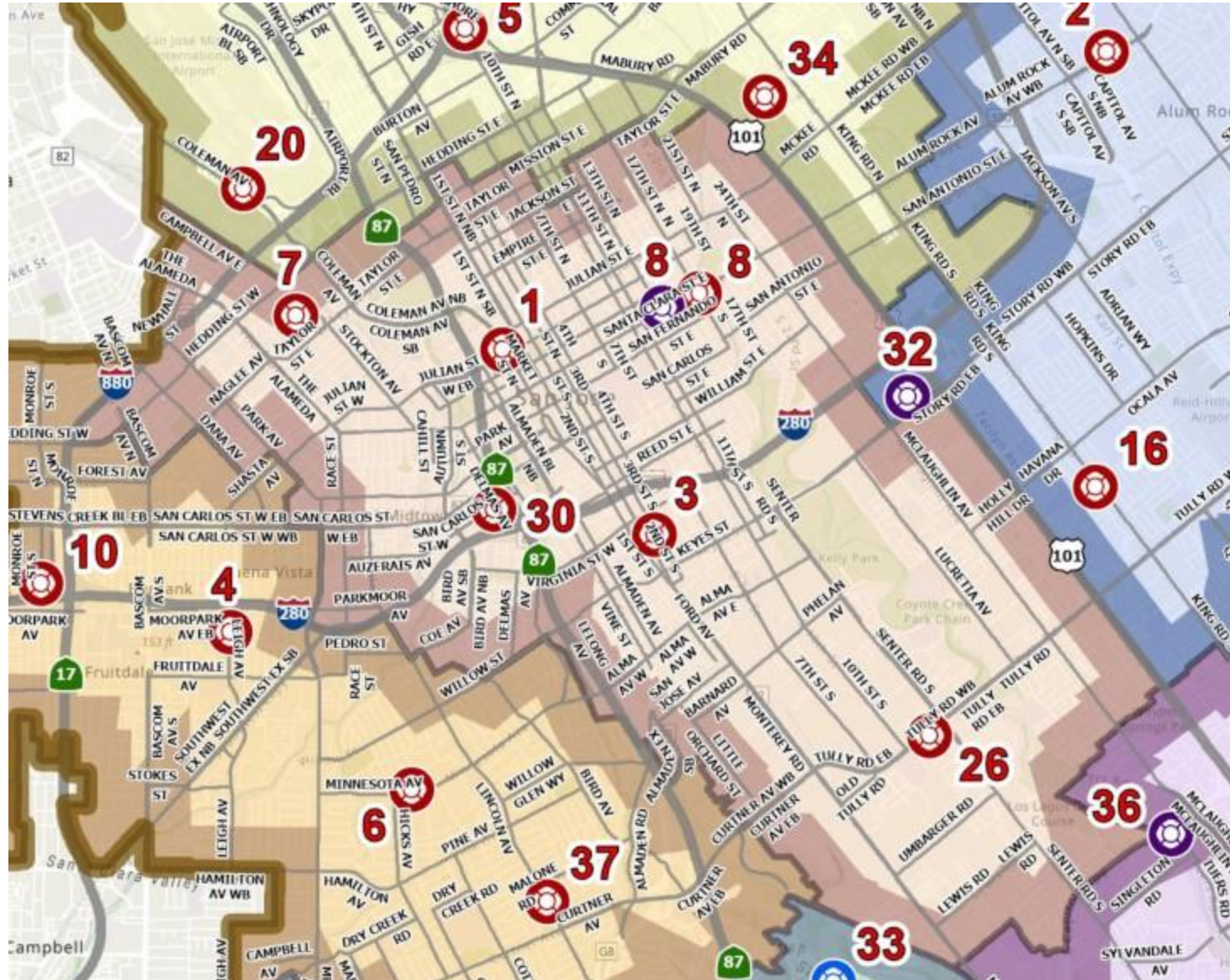


San Jose Fire Department Battalion Map-Streets:



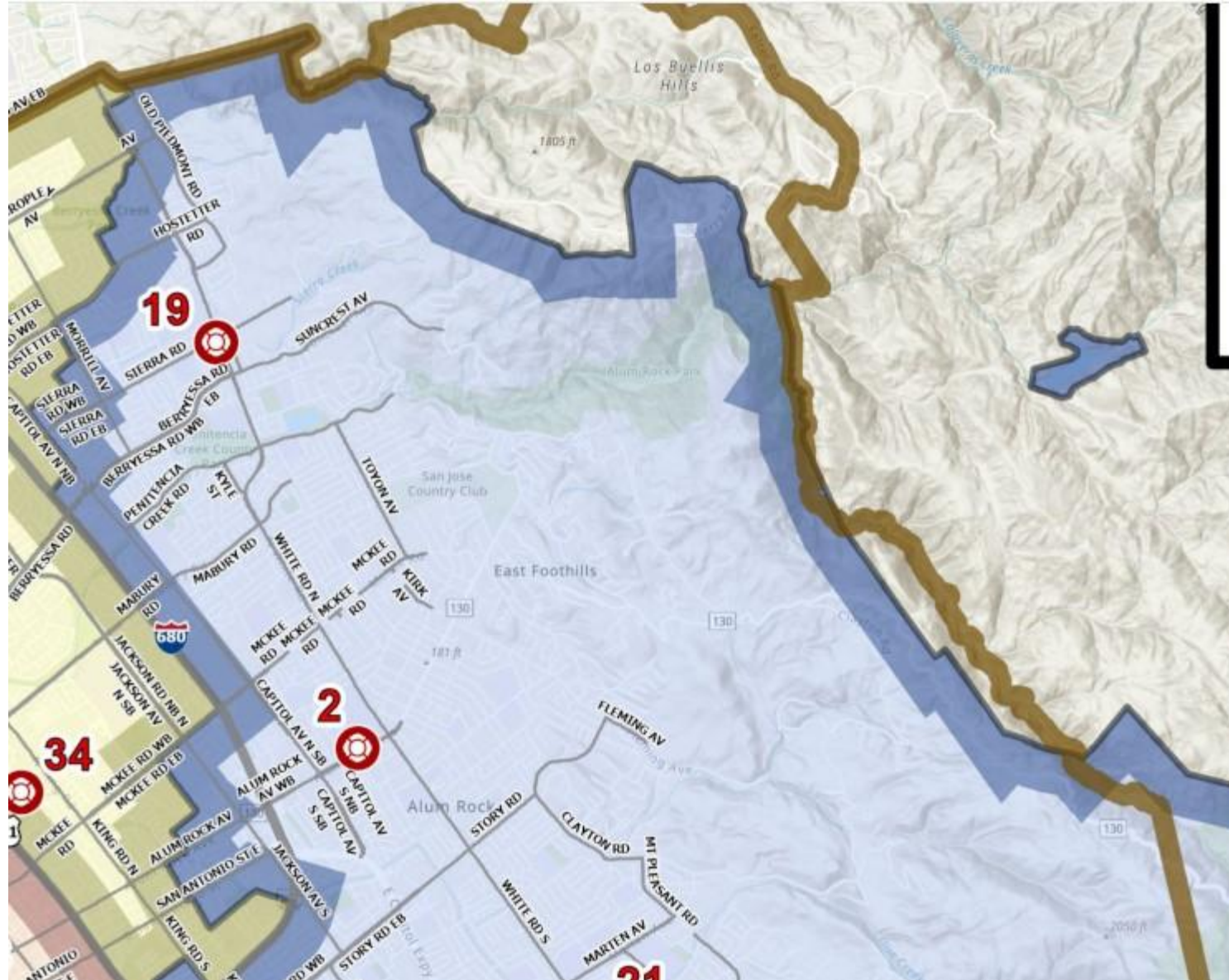


SJFD Battalion 1 Map:



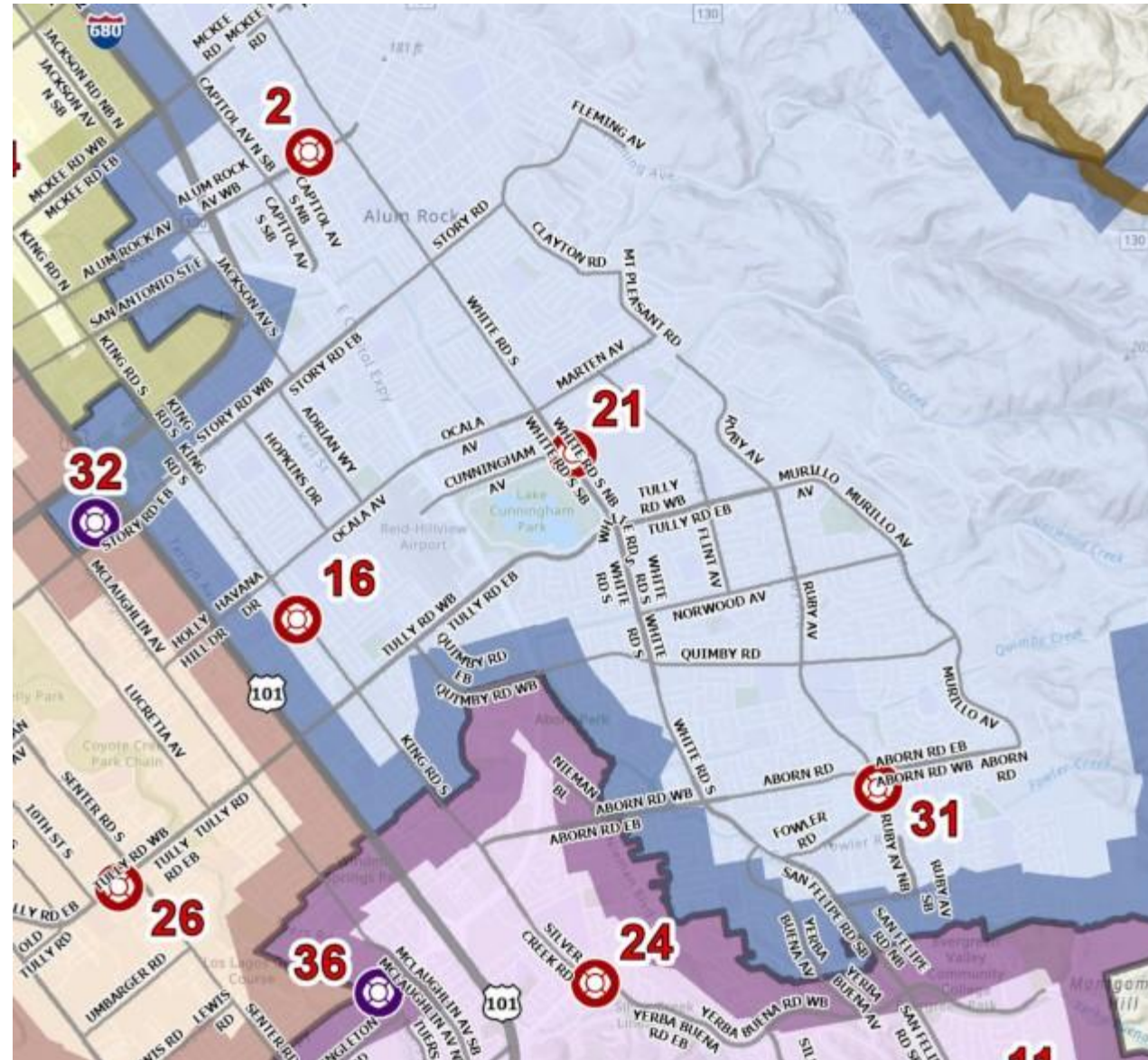


SJFD Battalion 2 North Map:



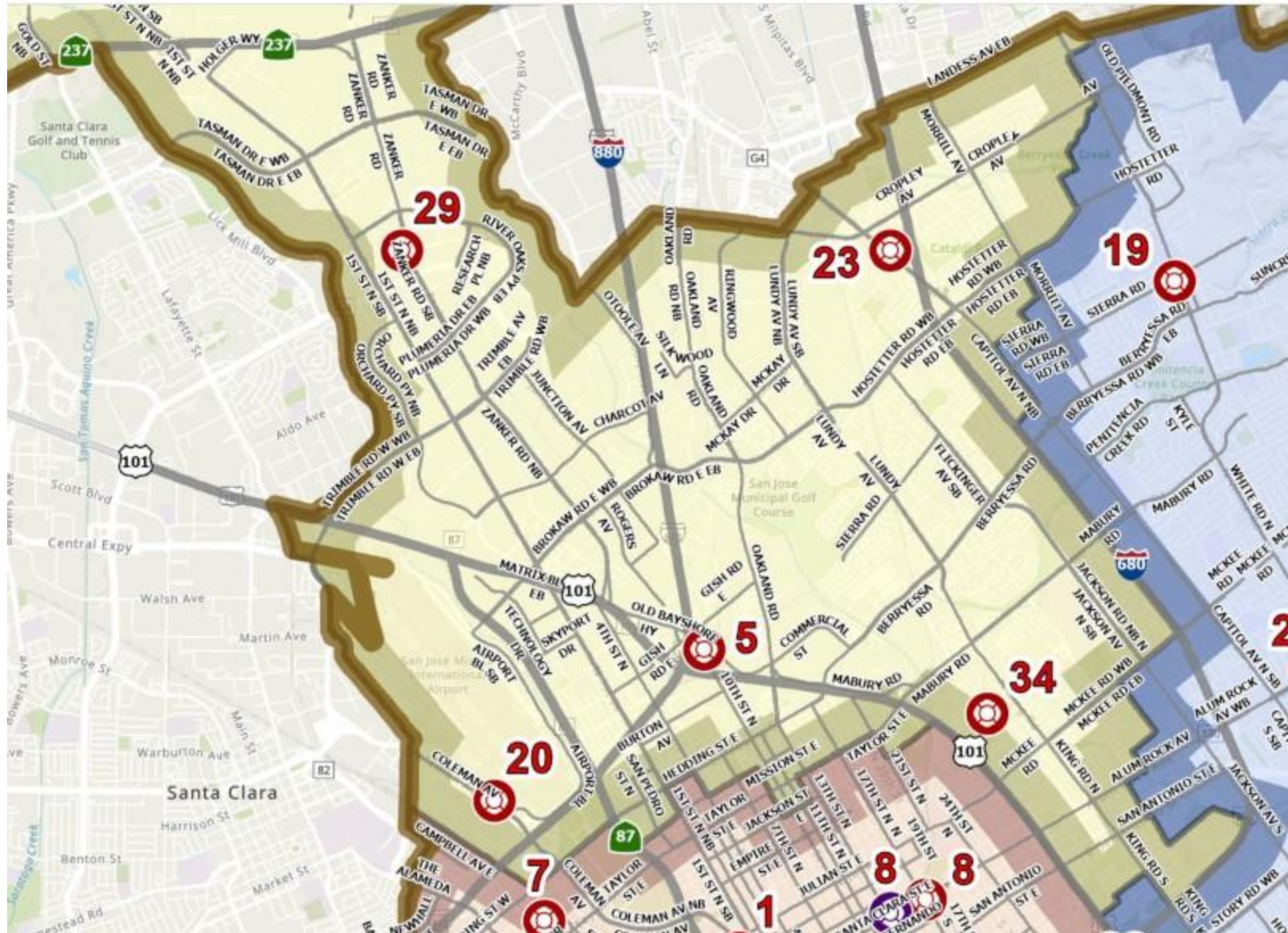


SJFD Battalion 2 South Map:



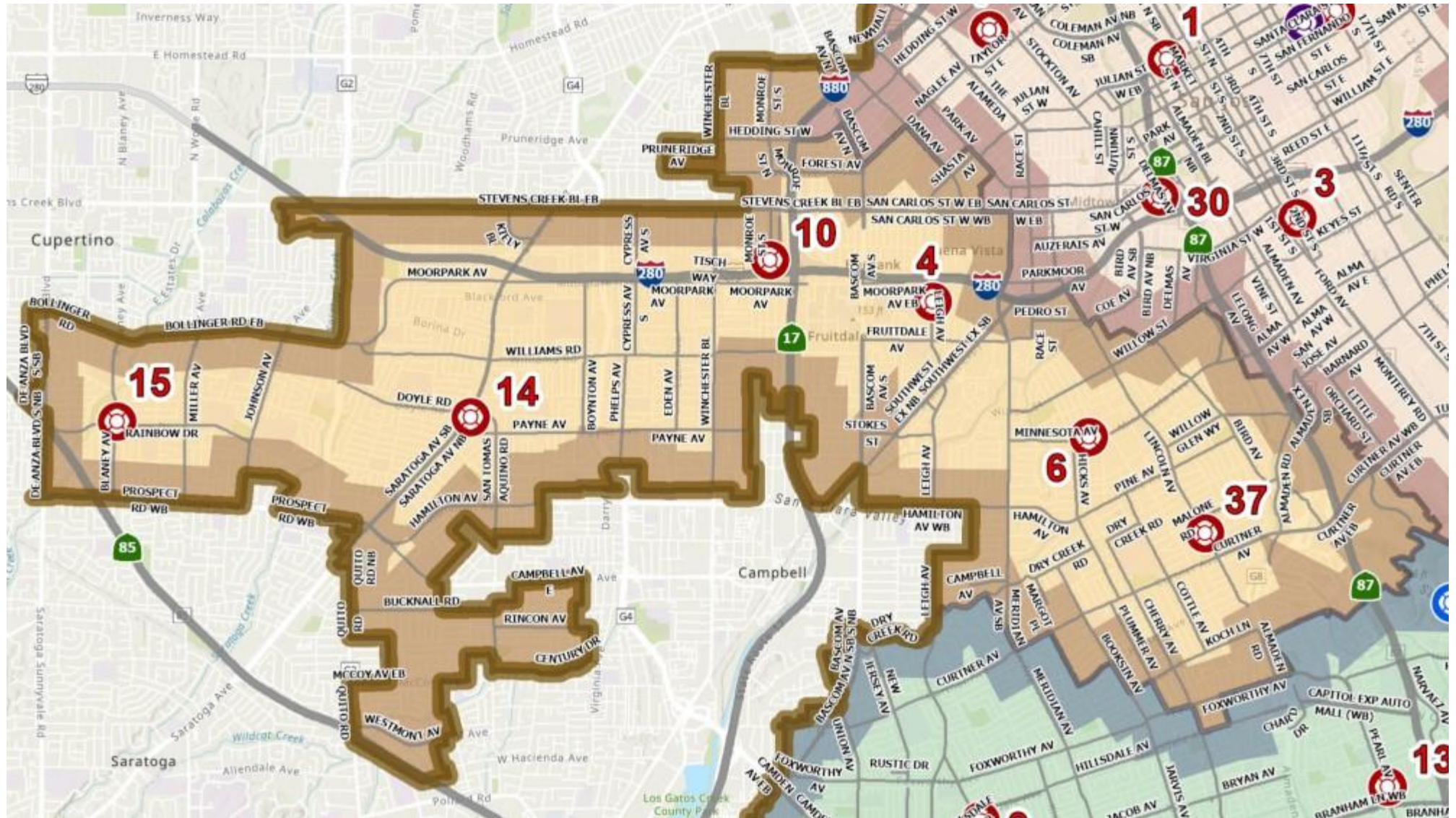


SJFD Battalion 5 Map:



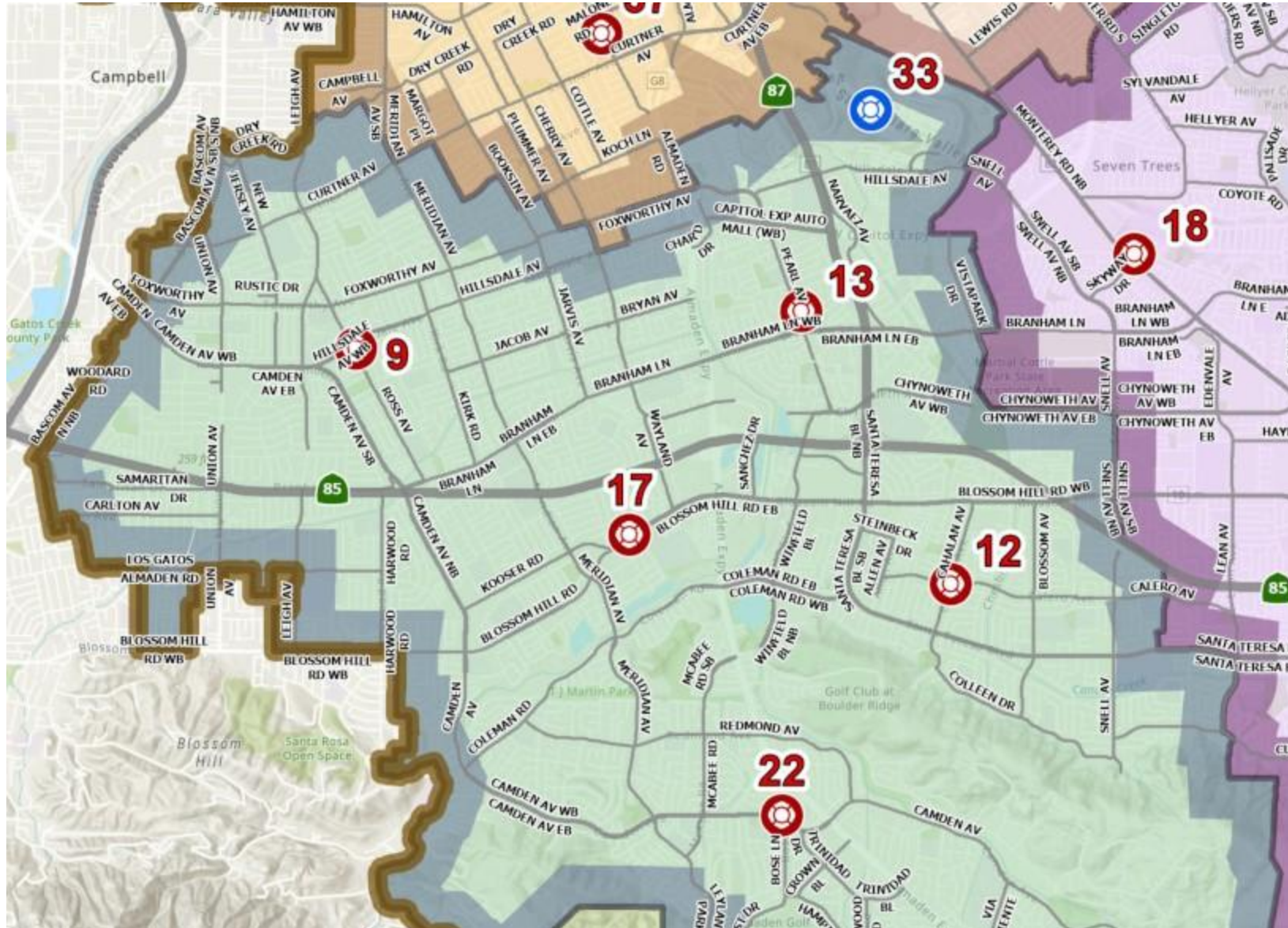


SJFD Battalion 10 Map:



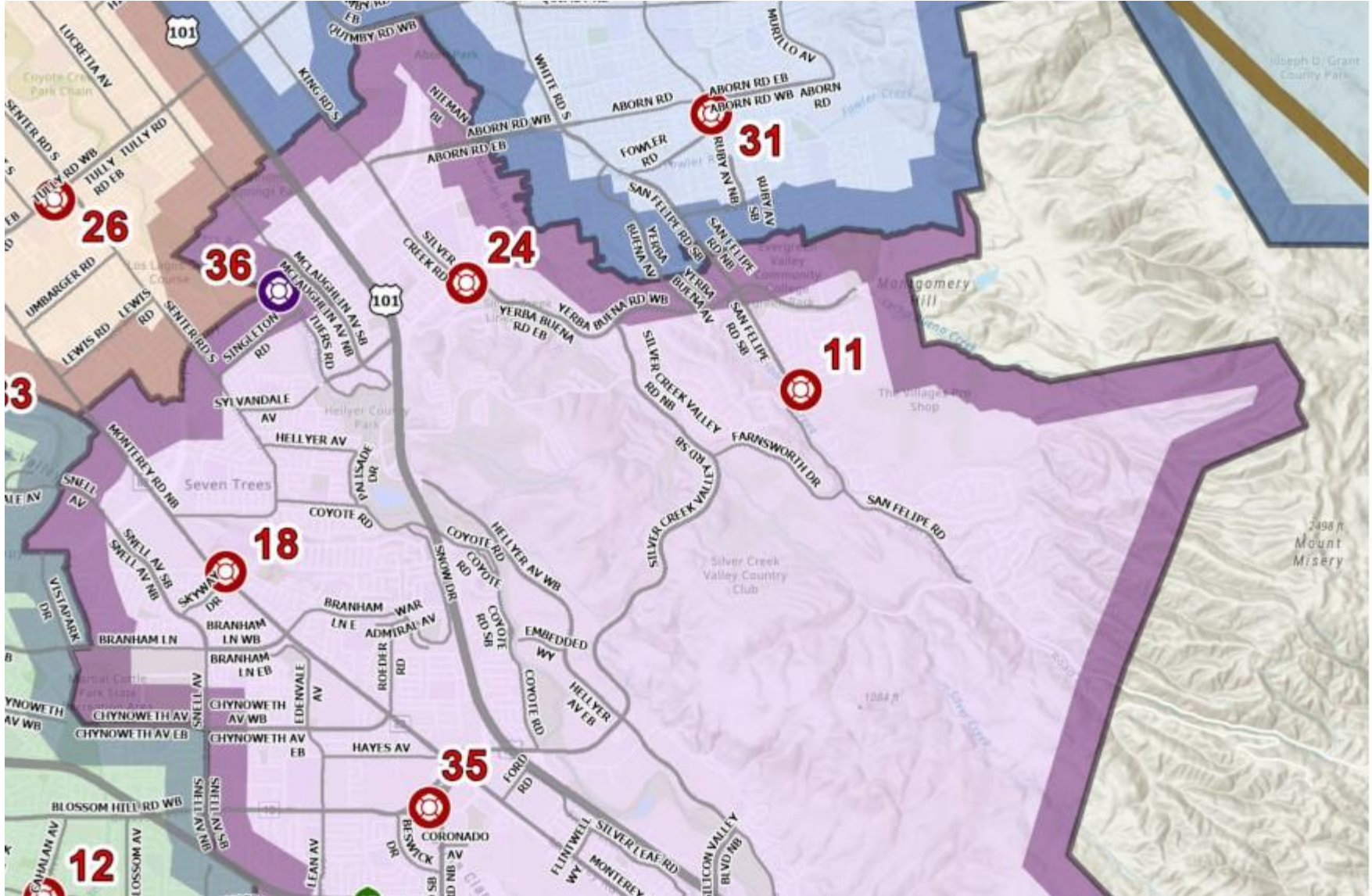


SJFD Battalion 13 Map:



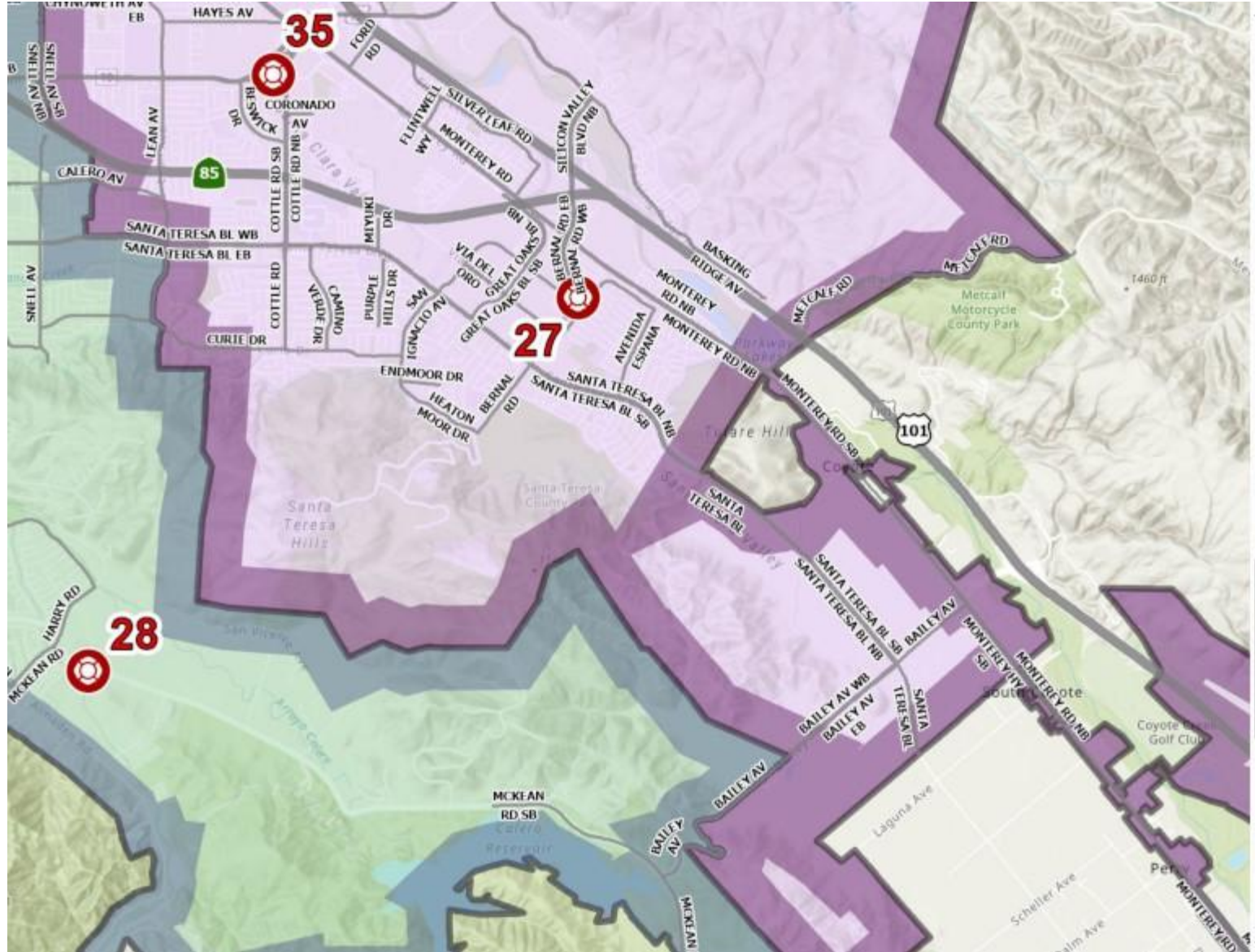


SJFD Battalion 35 North Map:





SJFD Battalion 35 South Map:

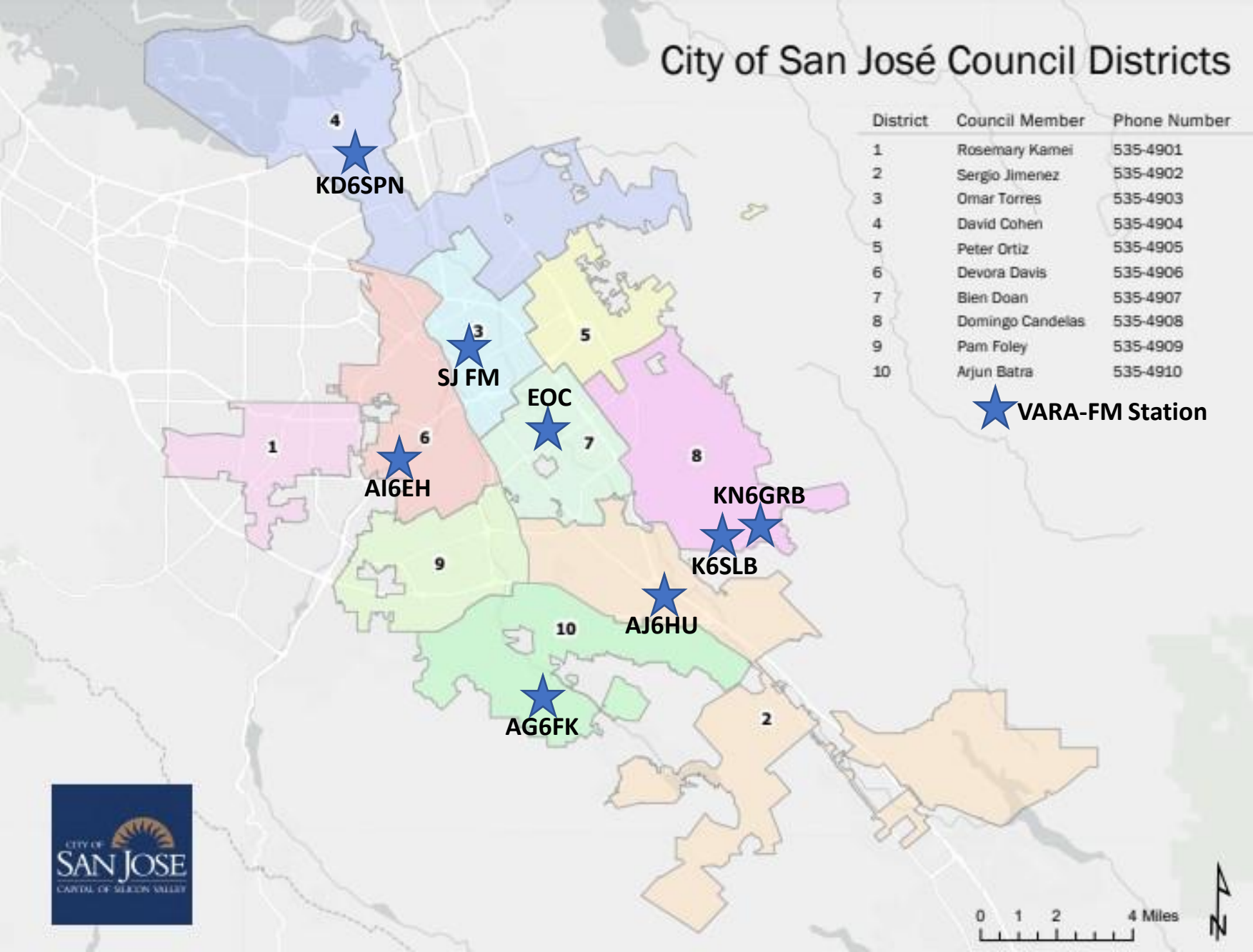




SJ CERT VARA-FM Stations:

VARA-FM COSTS:

HOME STA: \$1,600
MOBILE: \$1,200
CMD POST: \$2,200



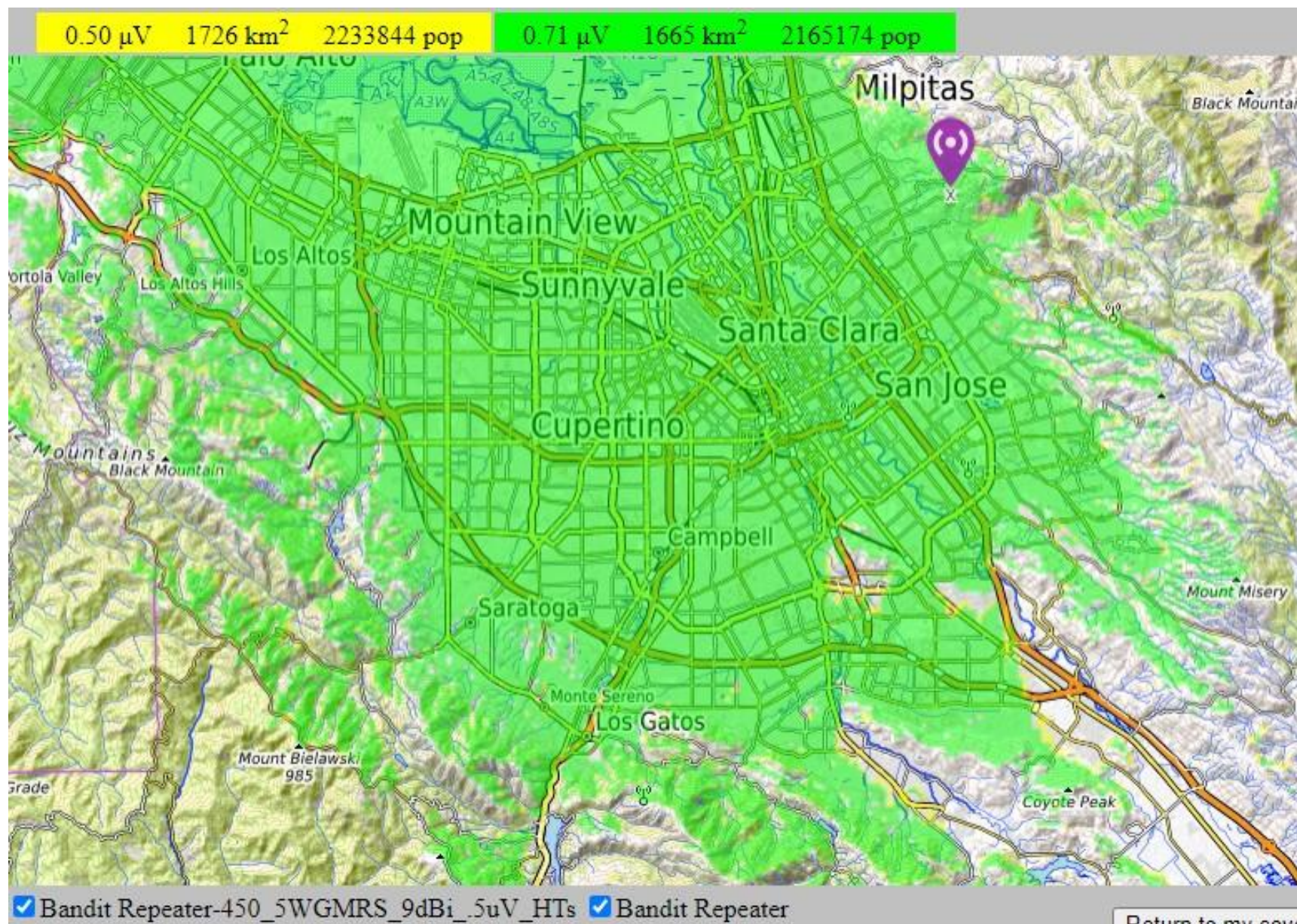


Radio Accessories:

- ❖ Magnetic mount NMO style GMRS mobile antenna. Around \$80. Allows best performance when mobile.
- ❖ Base station GMRS antenna, feed line cable, fiberglass extension mast, Around \$140. Use at neighborhood command post.
- ❖ 20 Amp-Hour LiPO4 battery. Around \$70. Use at neighborhood command post.
- ❖ Battery Charger. Around \$30. Use at neighborhood command post.

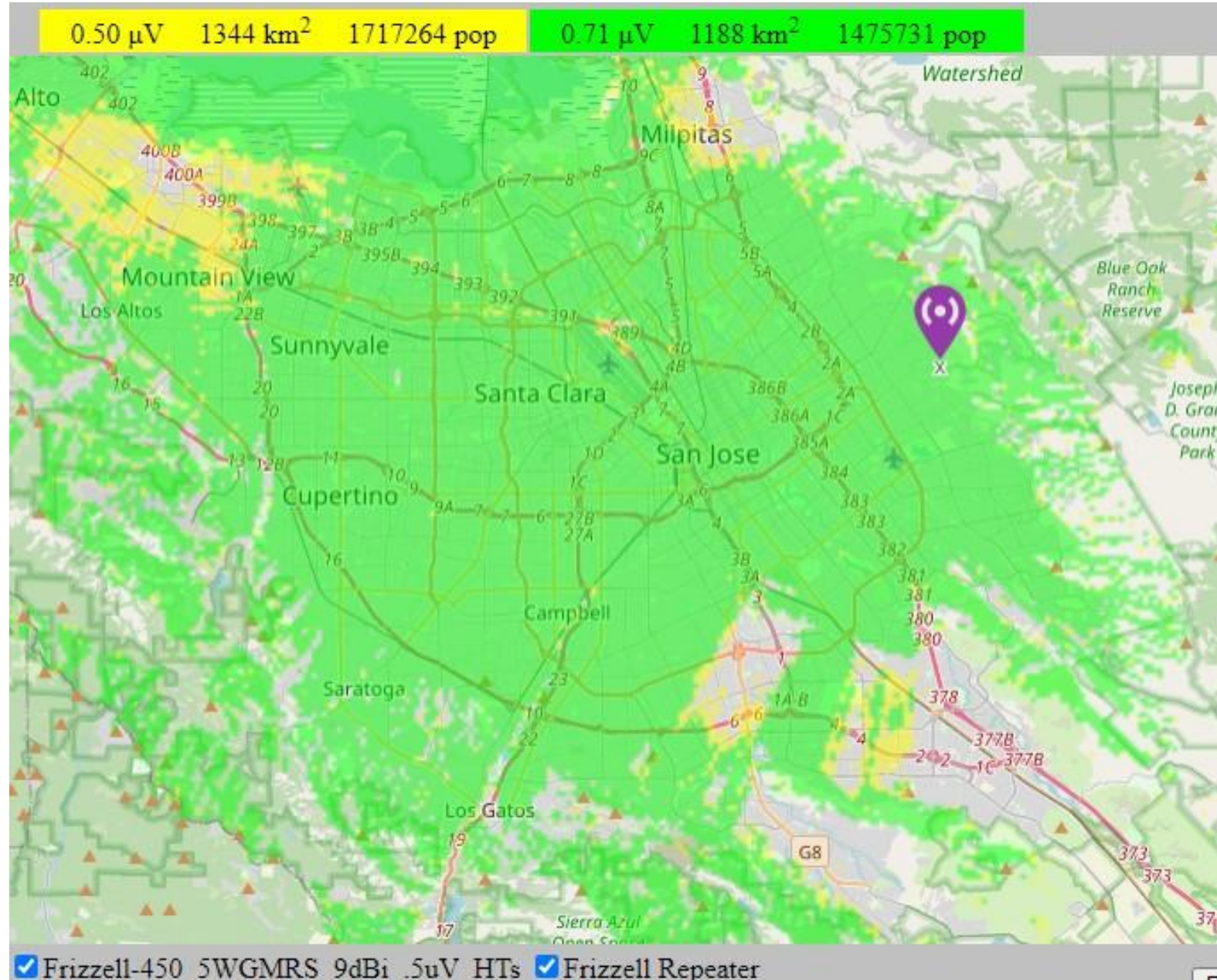


SJ CERT “BANDIT” GMRS Repeater Coverage:



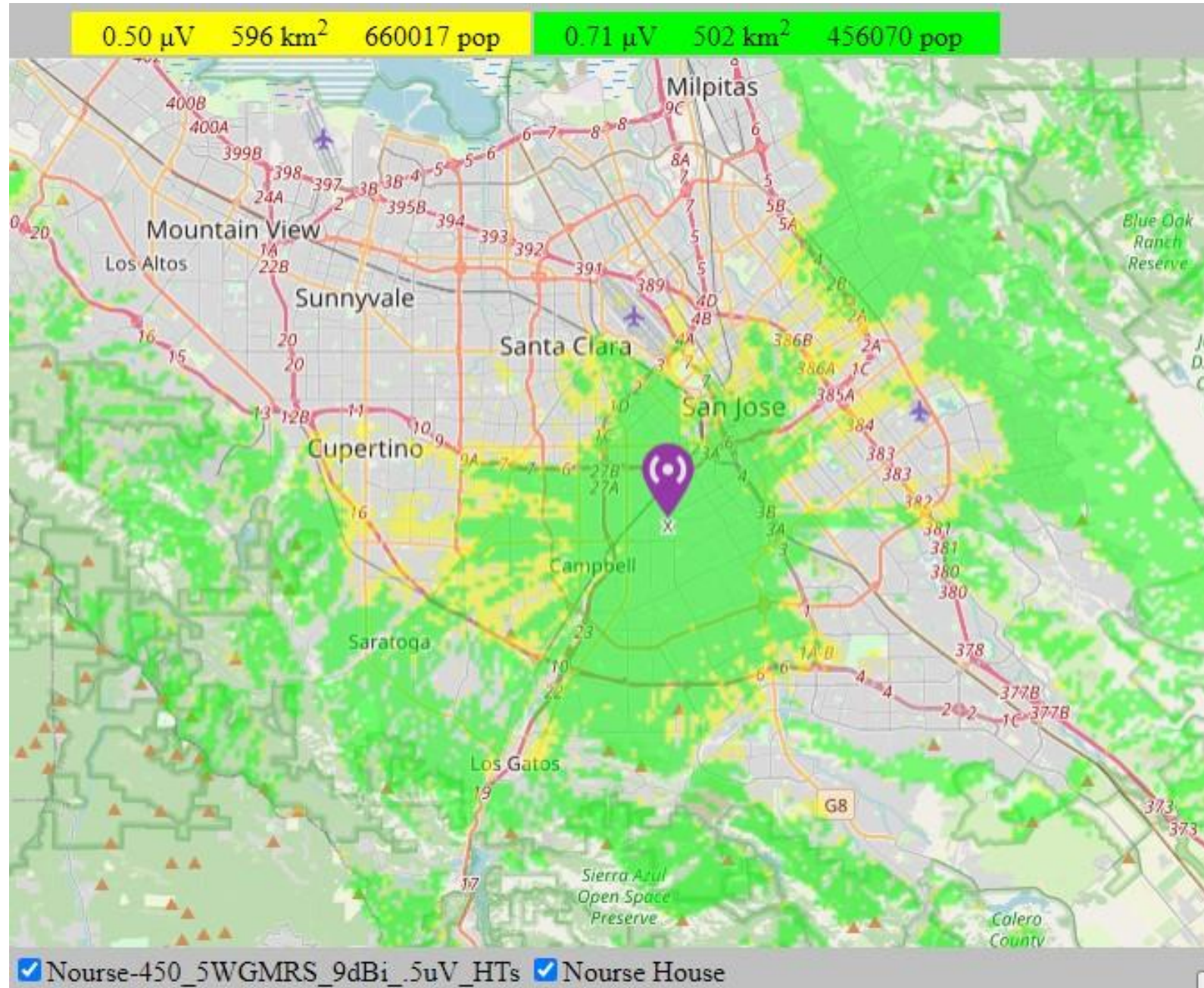


SJ CERT "CERT-1" Backup GMRS Repeater Coverage:





SJ CERT "CERT-2" Backup GMRS Repeater Coverage:





Simplex GMRS Repeater



Recorder stores a voice message heard received from a handheld transceiver (HT), then re-broadcasts it when the voice stops. HT is connected to an elevated external antenna.



Simplex GMRS Repeater Benefits/Recommendations

BENEFITS:

1. <\$350: Recorder=\$65, HT=\$50, Antenna = \$120, Mast & Feedline=\$100
2. Can be mobile. <\$225. Recorder=\$65, Radio=\$100, Antenna = \$50
3. Simple backup for standard CERT repeaters + Concurrent operations with CERT repeaters.
4. Immediate feedback of radio link performance. Great for unassisted testing.
5. Approximately 5 miles coverage per DCCC repeater. 3 Miles coverage for mobile repeater.

RECOMMENDATIONS:

1. Provide one simplex at each DCCC
2. Set up each repeater with TAC (Tactical) Channel for that Council District.
3. Provide one mobile simplex repeater per Council District.