

Region 6 700 MHz channel selection and usage documentation

Version 6

Applicant information

The Golden Gate Bridge, Highway and Transportation District is a Special District formed by the California Legislature in 1928 to build and operate the Golden Gate Bridge and the 101 transportation corridor up to the Oregon border. The Legislature expanded this role in 1969 when Golden Gate Transit and Golden Gate Ferry systems were added to its mission. The District's current jurisdiction includes the City and County of San Francisco, Marin County, Napa County, Sonoma County, Mendocino County and Del Norte County.

The District is responsible for the protection of life and property within the jurisdiction with emphasis on protecting the critical infrastructure of the Golden Gate Bridge and protecting the transit passengers utilizing Golden Gate Transit and Golden Gate Ferry. The District is headquartered in San Francisco and its Board of Directors includes nineteen members who represent all six (6) counties.

Documented Funding

The Project 25 700 MHz system proposed by Golden Gate Bridge Highway and Transportation District known as Advanced Communications & Information System (ACIS) is fully funded and contract number 2008-MD-1 has been awarded to GE Transportation in the amount of \$15,455,187 for implementation. Details concerning the funding sources and project scope are attached to this package as the Staff Report presented to and approved by the District Board of Directors meeting on November 24, 2008.

The contract signed by the Officers of the District who have financial authority is also attached to this package. Notice to Proceed was issued to GE Transportation on January 5, 2009. The District fully expects to have the system completed and operate at its necessary capacity within its initial construction period as identified by the FCC, 12 months from the date of license issuance.

System description

This Project 25 System will replace and consolidate three aging radio systems with a single shared trunked system which shall host all three operating entities of the District (Bridge, Bus Transit, Ferry Transit). When combined, the existing radio systems of the District hosts nearly 1200 subscriber units and we have a desperate need to add subscribers to support safety and protection operations around the District. In addition, the District is in advanced discussions with external federal, state and local public safety and transportation entities who have expressed interest in utilizing this system to support their respective operations.

This Golden Gate Bridge Highway and Transportation District 700 MHz application is for a two (2) zone simulcast system utilizing five (5) transmitter and receiver locations and twelve 700 MHz channel pair from Region 6 700 MHz Bay Area allotments. The system service area is identified as:

San Francisco City and County

Contra Costa

Marin County

Sonoma County

Napa County

Mendocino County

Del Norte County

The Golden Gate Bridge and all waterways of the San Francisco Bay to the Pacific Ocean.

System Sites, Parameters and Characteristics

Site Name	ERP [W]	Lat	Lon	AGL [ft]	GL [ft]	HAAT [ft]	Azimuth
Bald Pk	200.5	37-53-00.8 N	122-13-18.4 W	50.00	1840.55	1458.29	231.0
Big Rock-A 9 (N)	250.1	38-03-33.2 N	122-36-15.3 W	90.00	1850.39	1477.29	0.0
Big Rock-B 9 (SW)	250.1	38-03-33.2 N	122-36-15.3 W	90.00	1850.39	1477.29	238.0
Mt Tam	294.9	37-55-43.9 N	122-35-14.3 W	50.00	2329.40	2011.79	143.0
Sonoma Peak	282.0	38-20-53.8 N	122-34-41.1 W	150.00	2427.82	1974.63	310.0
Toll Plaza	200.1	37-48-26.5 N	122-28-34.6 W	50.00	203.41	126.22	180.0

Polygon utilized in Golden Gate Bridge District 700 MHz system Design

DeLorme

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700 MHz Channel Plan

700 MHz channel availability in Region 6 has been developed with the intent that channels are to be utilized in an interference-based methodology rather than a high site, noise limited methodology. The Golden Gate Bridge District (GGBD) application is dual zone simulcast with emphasis on wide area coverage rather than coverage based on a single county. Subsequently, establishing a wider area of operation over the entire region results in larger interference contours being established. The contours resulting from the simulcast zones in this application are larger than those anticipated when initially packing the Region 6 700 MHz channels.

Having 700 MHz system coverage over a wider area than initially anticipated can benefit other users in the region as well. A public safety grade radio system with wider area coverage in the San Francisco Bay Area can potentially facilitate interoperability between greater numbers of agencies taking advantage of the system's larger footprint and access to wide area, multi-county system coverage can also provide a degree of redundancy to agencies depending on county based coverage throughout the area.

700 MHz channel reuse recommendations from the National Coordination Committee, a Federal Advisory Committee convened by the FCC to develop the rules and system criteria for the public safety 700 MHz band, recommend the utilization of contours to determine adjacent and co-channel 700 MHz channel reuse. Interference contours (5 dBu F50, F50), Service Contours (40 dBu F50, F50) and Adjacent Channel contours (60 dBu F50, F50) are used to ensure that the Adjacent Channel Contour is approximately 20 dB above the 40 dBu Service Contour, at 60 dBu.

For co-channel assignments, the 40 dB μ service contour is allowed to extend beyond the defined service area by 3 to 5 miles, depending on the type of population density the application represents: urban, suburban or rural.

The co-channel 5 dB μ interfering contour of the system being reviewed (applicant) will be allowed to touch but not overlap the 40dB μ service contour of the system being protected (victim). All contours are (50, 50).

The impact of the interference contours created in Zone 1 and Zone 2 are:

Zone 1 Interference Contour is larger than the Zone 2 Interference Contour with a greater co-channel impact.

Both Interference Contours **completely** encompass the entire area of the following counties:

San Francisco, Alameda, Contra Costa, Solano, San Mateo, Santa Cruz, Sonoma, Napa, Lake, Colusa, Yolo

One or both interference contours **partially** encompass a portion of the following counties:

Santa Clara, San Benito, Monterey, Mendocino, Glenn, Sutter, Sacramento, Stanislaus, San Joaquin, Butte, Merced, Calaveras, Placer, Yuba

The contours for GGBD Zone 1 and Zone 2, as a limiting factor, similarly affect many of the same counties within Region 6 (See Interference Contours for Zone 1 and Zone 2 below). When selecting channels for use in the GGBD application, Golden Gate Bridge Highway and Transportation District has considered the aggregate interference contours of the two (2) simulcast zones and their impact on co-channel and adjacent channel users. For each channel pair selected, we have identified the co-channel and adjacent channel users impacted in the region. The following 700 MHz General Use channel pair have been selected from Bay Area allotments and are viable candidate frequencies for this GGBD application. They have been measured against each other and the regional plan to determine which has the least impact to remaining co-channel and adjacent channel allotments and channel availability for future applicants in the region.

Zone 1	19-20	161-162	259-260	373-374	701-702	839-840
Zone 2	97-98	201-202	405-406	299-300	679-680	741-742

We have documented the implementation of each of the channels selected in this application against other co-channel and adjacent channel allotments in Region 6 to allow for the region to interpret the application's impact. **Co-channel counties that are completely encompassed by a 5 dBu interference contour may have extremely limited use of that co-channel channel allotment in their county.**

Zone 1

Zone 1 19-20

Co-channel Counties	Adjacent Channel Counties
Madera	Sacramento (17-18)
Placer	San Benito (17-18)
Santa Clara	San Mateo (17-18)
Sonoma	

Summary:

Co-channel counties completely encompassed by Zone 1 interference contour are **Santa Clara** and **Sonoma**. **Placer** County allotments are partially encumbered by the Zone 1 interference contour. **Madera** County co-channel use is not impacted.

There are no adjacent channel county allotments **completely** encompassed by Zone 1 service contour. **San Mateo** County is partially encumbered by the Zone 1 service contour on channel 17-18. Adjacent channel allotments in **Sacramento** and **San Benito counties** on channel 17-18 are not impacted by this application.

Zone 1 161-162

Co-channel Counties	Adjacent Channel Counties
Kings	Alameda (163-164)
Madera	Fresno (163-164)
Santa Clara	Lake (163-164)
Solano	

Summary:

Co-channel counties **completely** encompassed by the Zone 1 interference contour are **Santa Clara** and **Solano**. Kings and Madera Counties are not impacted by this application at all.

Adjacent channel counties **partially** impacted by the Zone 1 service contour are **Alameda** and **Lake counties**. **Fresno** County is not impacted at all by this application.

Zone 1 259-260

Co-channel Counties

Adjacent Channel Counties

Kings

Contra Costa (257-258)

Napa

Merced (257-258)

Placer

Tulare (257-258)

Stanislaus

Summary: Co-channel county allotment completely covered by Zone 1 interference contour is **Napa**. Co-channel counties partially covered by the contour are **Stanislaus** and **Placer counties**. **Kings** county allotment is not impacted by this application.

Adjacent channel allotments in **Contra Costa** County are **partially** impacted by the Zone 1 service contour. Adjacent allotments in **Merced** County and **Tulare** County are not impacted at all by the Zone 1 service contour.

Zone 1 373-374

Co-channel Counties

Adjacent Channel Counties

Madera	Santa Cruz (371-372)
Napa	Tulare (371-372)
Santa Clara	Yolo (371-372)
	Alameda (375-376)
	Fresno (375-376)
	Lake (375-376)

Summary: Co-channel allotments **completely** impacted by Zone 1 interference contour are **Napa** and **Santa Clara**. **Madera** County co-channel allotment is not impacted by this application. Adjacent channel allotments **partially** impacted by the Zone 1 service contour are **Alameda and Lake**. Adjacent allotments in **Santa Cruz, Yolo, Fresno** and **Tulare** counties are not impacted by this application whatsoever.

Zone 1 701-702

Co-channel Counties

Madera

Santa Clara

Sonoma

Adjacent Channel Counties

Alameda (703-704)

Fresno (703-704)

Lake (703-704)

Summary: Co-channel county allotments **completely** impacted by the Zone 1 interference contour are **Santa Clara** and **Sonoma**. **Madera** County is in no way impacted by this application.

Adjacent channel allotments **partially** impacted by the Zone 1 service contour are **Alameda** and **Lake**. Adjacent allotment in **Fresno** County is not impacted by this application.

Zone 1 839-840

Co-channel Counties

Napa

Placer

Stanislaus

Adjacent Channel Counties

Kings (837-838)

Mariposa (837-838)

Sacramento (837-838)

San Mateo (837-838)

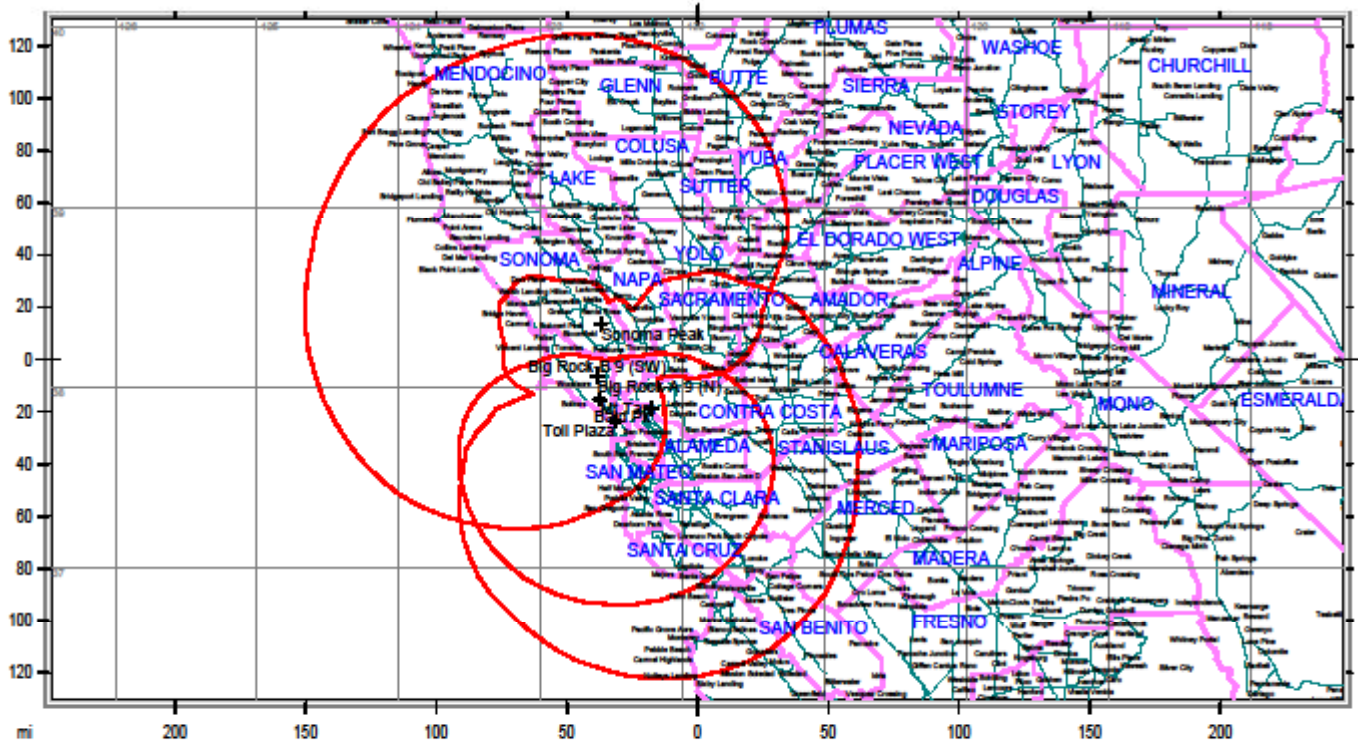
Tehama (837-838)

Summary: The co-channel county allotment **completely** impacted by the Zone 1 interference contour is **Napa**. Co-channel allotments partially impacted by the contour are in **Placer** and **Stanislaus**.

Adjacent channel allotment **partially** impacted by the Zone 1 interference contour is **San Mateo**. Adjacent channel allotment in **Sacramento, Tehama, Kings** and **Mariposa** counties are not impacted whatsoever by the Zone 1 service contour.

ZONE 1 Interference Contour

Contours: Red = 5 dBu



Cromack Industries, Inc.

County Borders Highways Lat/Lon Grid

ZONE 2

Zone 2 97-98

Co-channel Counties

San Francisco

Adjacent Channel Counties

Monterey (95-96)

Sacramento (95-96)

San Mateo (95-96)

Madera (99-100)

Placer (99-100)

Santa Clara (99-100)

Solano (99-100)

Summary: The co-channel allotment **completely** impacted by the Zone 2 interference contour is **San Francisco** County.

San Mateo county adjacent channel allotment is the only allotment **partially** impacted by the Zone 2 service contour. **Solano, Monterey, Sacramento, Placer Santa Clara** and **Madera** adjacent channel allotments are not in any way impacted by this application.

Zone 2 201-202

Co-channel Counties

Adjacent Channel Counties

Colusa	Glenn (203-204)
Contra Costa	Monterey (203-204)
Merced	Napa (203-204)

Summary: The Co-channel county allotments **completely** impacted by the Zone 2 interference contour are **Colusa** and **Contra Costa**. The **Merced** co-channel allotment is not impacted by this application.

Adjacent channel county allotment **partially** impacted by the Zone 2 interference contour is **Napa**. Adjacent channel county allotments in **Monterey** and **Glenn** counties are not impacted at all by the service contour of Zone 2.

Zone 2 405-406

Co-channel Counties	Adjacent Channel Counties
San Francisco	Mendocino (403-404)
San Joaquin	Napa (403-404)
	Stanislaus (403-404 407-408)
	Santa Cruz (407-408)

Summary: The Co-channel allotment completely impacted by the Zone 2 interference

Contour is **San Francisco**. **San Joaquin** co-channel county allotment is partially impacted by the Zone 2 interference contour.

Adjacent channel allotments **partially** impacted by the Zone 2 service contour is **Napa county**. **Mendocino, Stanislaus, Santa Cruz and Yolo** adjacent county allotments are not impacted by the Zone 2 service contour.

Zone 2 299-300

Co-channel Counties

Adjacent Channel Counties

San Francisco

Monterey (297-298)

Santa Cruz

San Joaquin (297-298)

San Mateo (297-298)

Summary:

Both **San Francisco** and **Santa Cruz** channel allotments are **completely** impacted by the Zone 2 interference contour.

The adjacent channel allotment **partially** impacted by the contour is **San Mateo**. Adjacent channel allotments in **San Joaquin** and **Monterey** counties are not impacted by the Zone 2 service contour.

Zone 2 679-680

Co-channel Counties

San Benito

Sonoma

Adjacent Channel Counties

Contra Costa (677-678)

Kings (677-678)

Madera (677-678)

Summary:

Sonoma County channel allotment is **completely** impacted by the Zone 2 interference contour. **San Benito** co-channel allotment is **partially** impacted by the contour.

Adjacent channel allotment in **Contra Costa** County is **partially** impacted by the Zone 2 service contour. **Kings** and **Madera** channel allotments are not impacted at all by this application.

Zone 2 741-742

Co-channel Counties

Colusa

Adjacent Channel Counties

Monterey (743-744)

Contra Costa

San Joaquin (743-744)

Merced

Yuba (743-744)

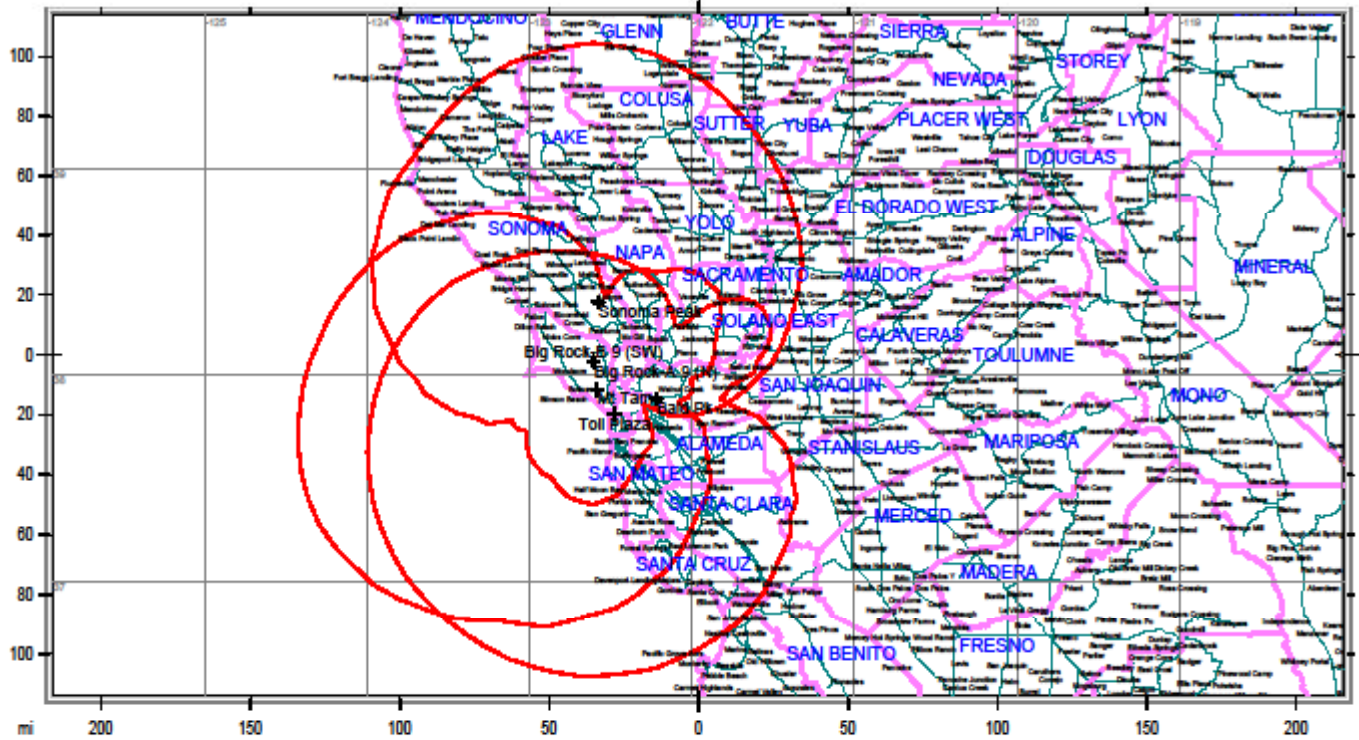
Summary:

Co-channel allotments in **Colusa** and **Contra Costa** County are **completely** impacted by the Zone 2 interference contour. Co-channel allotments in **Merced** County are not impacted by this application.

Adjacent channel allotments in **Monterey, San Joaquin** and **Yuba** counties are **in no way** impacted by the Zone 2 service contour.

ZONE 2 Interference Contour

Contours: Red = 5 dBu



Cromack Industries, Inc.

County Borders Highways Lat/Lon Grid

Number of channel allotments per county, Region 6 prior to Golden Gate Bridge
District application

County	Existing allotments	Allotments available after GGBD application Vs 3
Alameda	57	54 (minus 3 adjacent channels)
Alpine	11	11
Amador	8	8
Butte	17	17
Calaveras	9	9
Colusa	33	32 (minus 1 co-channel)
Contra Costa	40	37 (minus 2 adjacent and 1 co-channel)
Del Norte	12	12
El Dorado	18	18
Fresno	51	51
Glenn	14	14
Humboldt	17	17
Inyo	8	8
Kings	18	18
Lake	54	51 (minus 3 adjacent)
Lassen	9	9
Madera	52	52
Marin	27	27
Mariposa	15	15
Mendocino	36	36
Merced	37	37

Modoc	11	11
Mono	7	7
Monterey	37	37
Napa	30	25 (minus 3 co-channel and 2 adjacent)
Nevada	10	10
Placer	29	27 (minus 2 co-channel)
Plumas	6	6
Sacramento	47	47
San Benito	18	17 (minus 1 co-channel)
San Francisco	31	28 (minus 3 co-channel)
San Joaquin	31	30 (minus 1 co-channel)
San Mateo	41	37 (minus 4 adjacent)
Santa Clara	57	53 (minus 4 co-channel)
Santa Cruz	29	28 (minus 1 co-channel)
Shasta	21	21
Sierra	5	5
Siskiyou	11	11
Solano	26	25 (minus 1 co-channel)
Sonoma	37	34 (minus 3 co-channel)
Stanislaus	27	25 (minus 2 co-channel)
Sutter	10	10
Tehama	12	12
Trinity	9	9
Tulare	28	28
Tuolumne	8	8
Yolo	19	19
Yuba	11	11