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TRANSFORMING TRANSPORTATION IN VENTURA COUNTY

System Modernization Project 3G Technology Upgrade and Site Removal Analyses

FY 2014-2015

Prepared for the Ventura SAFE by
TeleTran Tek Services, Inc.

Foreword

This System Modernization Project document was originally prepared in November of 2014 at the request of and in cooperation with SAFE Staff. It describes the analyses used to identify future call box system needs in light of reduced call volumes, required cellular technology upgrades and desired enhancement to call box site configurations to enhance access for persons with mobility disabilities.

Since that time, revisions to quantities and estimated prices based upon continued analyses and newer prices have been made with Staff, and are included in the Agenda Item for SAFE Call Box Permanent Removal Approval. Appendix A has been updated with the most current recommendations, and Appendix B contains a new 5-Year Life Cycle Cost Estimate using the updated recommendations.

Contents

Current System Status

The Ventura County SAFE and the other call box programs that use AT&T Wireless for their cellular service have been informed that AT&T will completely discontinue 2G cellular service by the end of December 2016 in favor of increasing the number of its 3G and 4G channels. Working toward the published end date, AT&T has already begun to replace its 2G channels with 3G in selected cell towers, and will continue to do so over the next two years as it evaluates the business case for each area. Verizon Wireless has stated that it will continue 2G digital service until 2019.

The AT&T network works with the GSM transceiver protocol, while the Verizon network works with the CDMA transceiver protocol. Because these technologies are incompatible, GSM call boxes will not communicate with CDMA networks, nor will CDMA call boxes communicate with GSM networks. Therefore, a call box program cannot simply switch cellular vendors without also changing its communications protocol.

All existing call boxes throughout California have used 2G technology since the mid-2000's, and will not communicate with 3G cellular service. Because AT&T does not publish which cell towers will be changed at what time, the Ventura SAFE must upgrade every call box in its call box system (subject to the discussion below on permanent site removals) to 3G technology on an expedited basis to be able to continue to offer call box assistance.

Despite the published end date of December 2016, AT&T has already begun, without written notice, to turn off its 2G channels in Ventura County and elsewhere. It is likely that cellular vendors will continue to offer 3G voice service for the foreseeable future, as it is now the primary technology used in cell phones to provide voice calls. The recommended equipment upgrade should therefore continue to serve the Ventura SAFE call boxes for many years.

Recommended Solutions

Given the immediate need to upgrade all call boxes, the Ventura SAFE Board should consider the following actions:

1. Authorize SAFE Staff to negotiate a contract with CASE Systems, Inc. to retrofit Ventura SAFE system call boxes with a 3G upgrade kit.
2. Authorize SAFE Staff to negotiate or otherwise obtain a new five-year cellular service contract.
3. Authorize SAFE Staff to identify and arrange for the removal of selected call boxes throughout the system.

Based upon available information from AT&T Wireless, some limited areas in Ventura County will already have lost 2G signal by September 1, 2014. The remaining areas will lose 2G signal at unspecified times thereafter through perhaps

late 2015. With the exact timing of loss of 2G service in different areas within Ventura County unknown, the Ventura SAFE must upgrade every call box in its call box system to 3G technology on an expedited basis to be able to continue to offer call box assistance (subject to the discussion below on permanent site removals).

Technology Upgrade Project

CASE Systems, Inc. (CASE) is the current provider of call box equipment and system maintenance for the Ventura SAFE. The contract for those services runs through June 30, 2015. As of January 2013, CASE is also the only seller of the dual voice call box technology used throughout California, and the sole source for 3G technology upgrades. In preparation for the published December 31, 2016 cessation of 2G service by AT&T, and the expected conversion from 2G to 3G technology by other cellular service providers, CASE has developed a 3G upgrade package for call boxes using Verizon CDMA digital service. Because this product has already been tested by CASE and certified for use on its cellular system by Verizon Wireless, it is currently available to order. CASE estimates a 6-8 week delivery time from the order date. CASE also estimates a 6-8 week upgrade kit installation schedule.

CASE has also developed and tested internally a GSM 3G upgrade kit for call box systems using the GSM digital technology currently in the Ventura SAFE system call boxes. Unfortunately, CASE estimates that the certification process required for this version of the upgrade kit will take another 3 to 4 months to complete, making possible delivery of that product after order as much as 6 months away.

CASE has provided a preliminary cost for the equipment upgrade and installation of $800 per call box for either the CDMA or GSM upgrade kits. That is a decrease of $650 per box from the originally estimated $1,450. The system-wide upgrade cost, with 20% contingency, would therefore be approximately $543,000 for the Ventura SAFE system as it currently exists. Because its upgrade process can better be expedited, the CDMA option might be a better choice.

Cellular Service Contract

The Ventura SAFE currently is in the 4th of 5 option years of its contract for cellular service with AT&T Wireless, following the initial 5-year contract period. The contract specifies that the Ventura SAFE may terminate the contract for any reason upon 30 days written notice. Each option year expires on December 31st of that year.

The Ventura SAFE currently pays approximately $6.50 per call box per month for GSM digital service from AT&T. By comparison, the MTC SAFE in the Bay Area pays only $.06 per minute for CDMA digital service from Verizon, plus minimal regulatory fees. On average, the cost per month per call box reported by the MTC SAFE is only $0.50. MTC SAFE obtained this excellent pricing directly from the State of California WSCA3 pricelist, which is available to all California public entities. Contacts at AT&T indicate that AT&T can provide the same $.06 per minute pricing under WSCA3. However, the billing process used by AT&T to be able offer that price involves both computer-generated billings as well as hand prepared revisions, and has proven no

small problem for SAFE Staff in other SAFEs while attempting to reconcile the billed amount with the revised amount.

Since cellular service cost under WSCA3 is the same for both cellular providers, issuing a full Request for Proposals may be unnecessary. Perhaps a simple Request for Quotes under WSCA3 would suffice, if needed at all. Further, should the Ventura SAFE select the CDMA technology upgrade package because of its more expedited installation schedule, only Verizon would be able to provide the CDMA service for that equipment.

Call Box Removal Project

The Ventura SAFE should consider permanently removing selected call boxes in conjunction with the technology upgrade by increasing spacing between those that remain in place. This action makes good sense for three reasons:

1. Call box spacing in Ventura County was originally based in part upon 1990's expected call box call volumes and the lack of available assistance other than through the use of a call box at that time. These factors simply no longer apply.

    a. Call box call volumes have reduced in the period 2000 to 2013 from 17,000 calls to 2,800 calls (Table 1). Similar reductions in call volume have been experienced by all California call box programs. Because of the much lower call box call volume, fewer call boxes are needed to serve the motoring public.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Jan	1,269	1,028	774	656	531	546	389	312	282	360	318	362	249	236	154	Jan
Feb	1,442	959	859	697	567	457	406	262	292	234	270	195	204	317	273	Feb
Mar	1,387	1,030	696	592	543	407	376	328	288	340	330	303	309	347	*** 296**	Mar
Apr	1,521	*** 1,209**	850	708	578	532	442	626	376	387	322	341	252	203	277	Apr
May	1,489	1,086	824	681	565	494	487	*** 733**	430	392	298	220	299	123	220	May
Jun	*** 1,679**	1,077	883	733	587	551	522	590	335	223	227	260	216	296	292	Jun
Jul	1,584	1,159	906	*** 805**	*** 667**	549	*** 539**	517	388	374	337	323	318	296		Jul
Aug	1,650	1,156	*** 954**	792	665	*** 563**	497	540	*** 445**	*** 467**	371	313	284	*** 370**		Aug
Sep	1,362	1,023	861	720	666	440	424	507	311	416	*** 387**	271	296	246		Sep
Oct	1,203	909	731	628	579	444	489	473	323	331	263	257	252	111		Oct
Nov	1,275	811	818	660	516	446	374	428	331	201	273	*** 362**	*** 461**	148		Nov
Dec	1,151	800	671	545	481	386	293	323	155	193	231	238	193	109		Dec
TOTALS	17,012	12,247	9,827	8,217	6,945	5,815	5,238	5,639	3,956	3,918	3,627	3,445	3,333	2,802	1,512	TOTALS

* Represents the highest monthly call volume for that year (light blue shading).

Call total since January 1st, 2000 93,533

Table 1: Call Box Call History

    b. Today, assistance is much more readily available because of a significantly expanded cellular signal footprint, the proliferation of personal cell phones and in-vehicle assistance programs (e.g., OnStar and manufacturer help lines), and the addition of many new businesses and homes near highway exits at which a motorist might seek help. A study performed for the MTC SAFE in the San Francisco Bay Area in December 2011 found the following, which would apply to the Ventura SAFE as well:

        i. Only 5% of call box calls involved emergency situations, while

50% of calls were for non-emergency roadside assistance, with the remainder inappropriate calls or maintenance calls.

ii. Nearly 80% of call box calls occur between 6:00 am and 8:00 pm, when other sources of assistance are more available.

iii. Almost 95% of motorists own cell phones and have them with them when they drive;

iv. Almost 90% of motorists with disabilities own a cell phone. Many of those without cell phones often have a passenger with a cell phone.

2. Call box reductions have already been approved and completed by a number of other California SAFEs, making a reduction program by the Ventura SAFE well within their parameters. Table 2 below provides examples of the removal projects already completed or underway.

SAFE	REMOVAL PROJECT
Los Angeles	50%
Riverside	50%
Orange County	50%
San Diego	20%
MTC	50% urban; selected rural

Table 2: Removal Projects

With a smaller but robust call box system now feasible, reducing the number of call box sites would also reduce the cost to upgrade them to 3G technology, and concurrently provide reduced annual expenditures on cellular and call box maintenance services, as noted in the Five-Year Life Cycle Cost Analysis below.

Process

SAFE Staff, assisted by T-Cubed, undertook a system analysis to identify what factors should be analyzed in determining which sites to remove. They began with criteria set out in the 2007 *CHP/Caltrans Call Box and Motorist Aid Guidelines* (the *Guidelines*) under which all call box programs operate, and combined those factors with lessons learned from other SAFEs that have implemented system reduction programs. From those sources, three key focuses for analysis were identified:

1. Determining what level of permanent site removals would provide an appropriate system reduction while maintaining service to motorists in need,
2. Evaluating which sites currently require retrofits for enhanced site accessibility, and

3. Identifying sites currently removed on a temporary basis.

From April-June 2014, T-Cubed performed both a desk review and field survey of all Ventura County SAFE call box sites to evaluate them on such factors as site type, spacing, urban/rural character and accessibility for persons with disabilities. The results from the analyses of each of these factors have been used in the ultimate recommendations for site retention, removal and retrofit presented at the end of this Report.

Spacing

The 2007 *Guidelines* sets out suggestions for spacing between call box sites, based upon Average Daily Traffic (ADT) levels reported by Caltrans for the applicable highway segment. Wherever possible, call box programs have complied with these suggestions during the call box installation process.

ADT	SUGGESTED SPACING
Lower than 40,000	2 miles or more
40,000 to 75,000	1 mile to 2 miles
75,000 to 100,000	.5 mile to 1 mile
Higher than 100,000	.5 mile

Table 3: *Guidelines* Spacing Suggestions

The *Guidelines* also recognize terrain, available revenue, urban/rural characteristic, proximity of roadside services and historical call box usage as factors to take into consideration. In more rural areas, additional factors include cellular coverage and isolation.

With the exception of one pair on US 101, all Ventura SAFE call boxes currently comply with the Suggested Spacing in the *Guidelines*. Urban call boxes are spaced between .25 mile and 1.0 mile, with the majority at .5 mile spacing. Rural Call boxes are spaced generally between .5 mile and 1.0 mile, with some spaced further apart when terrain or cellular signal dictate.

In considering possible site removals, SAFE Staff directed T-Cubed to evaluate the level of system reduction from two scenarios:

- **Scenario 1:** One mile or greater spacing along urban highway segments, with one-half mile spacing in rural areas; and
- **Scenario 2:** One mile or greater spacing along urban highway segments, with one mile or greater spacing in rural areas.

The actual spacing ultimately selected would of course be subject to available cellular signal and acceptable site safety characteristics.

Ventura SAFE Staff also selected 25% or less as the preferred level for the overall system reduction. Urban highway segments in general have the highest ADT, but also have the most available roadside services, cellular signal and other motorists to report disabled motorists or accidents on their cell phones. Rural areas are the

opposite, and therefore have a greater need for call boxes as a "safety net". Applying these spacing criteria would result in the continuation of necessary call box services, while allowing for reduction of the overall call box system to meet changed needs.

The Ventura SAFE Staff and T-Cubed used the following breakdown to identify highway segments as either Urban or Rural.

1. Urban Highways
    a. US 101 from LA County to SR 33
    b. SR 126 from US 101 to Santa Paula
    c. SR 23 from SR 118 to US 101
2. Rural Highways
    a. US 101 from SR 33 to SR 150
    b. US 1 all
    c. SR 33 (all; CB end before Ojai)
    d. SR 126 from Santa Paula to LA County
    e. SR 23 from SR 126 to SR 118
    f. SR 118 all (no CB within Moorpark)
    g. SR 34 from Oxnard to US 101

Using these parameters, Scenario 1 (0.5 mile Rural spacing) would result in a system reduction of 22%, while Scenario 2 (1.0 mile Rural spacing) would result in a system reduction of nearly 50%. Given those results, T-Cubed analyzed only Scenario 1 further. Note that Scenario 2 could form the basis for a later system reduction if desired by the Ventura SAFE Board. Table 4 below presents the estimated number of permanent site removals by highway segment and Urban/Rural characterization that would result were Scenario 1 to be implemented.

HIGHWAY	CALL BOXES		COUNT	REMOVAL RECOMMENDATIONS TO ACHIEVE STATED SPACING	
	START	END		URBAN 1.0 RURAL 0.5+	PERCENT REMOVED
US 1 (RURAL)	1-002	1-136	59	0	
TOTAL US 1			**59**	**0**	**0.0%**
SR 23 (URBAN)	23-32T	23-117	35	17	
SR 23 (RURAL)	23-053	23-233	8	0	
TOTAL SR 23			**43**	**17**	**39.5%**
SR 33 (RURAL)	33-002T	33-63	24	0	
TOTAL SR 33			**24**	**0**	**0.0%**

HIGHWAY	CALL BOXES START	CALL BOXES END	COUNT	REMOVAL RECOMMENDATIONS TO ACHIEVE STATED SPACING URBAN 1.0 RURAL 0.5+	REMOVAL RECOMMENDATIONS TO ACHIEVE STATED SPACING PERCENT REMOVED
SR 34 (RURAL)	34-086	34-105	3	0	
TOTAL SR 34			**3**	**0**	**0.0%**
US 101 (URBAN)	101-004	101-307	156	78	
US 101 (RURAL)	101-312	101-433	48	0	
TOTAL US 101			**204**	**78**	**38.2%**
SR 118 (RURAL)	118-002	118-327	79	2	
TOTAL SR 118			**79**	**2**	**2.5%**
SR 126 (URBAN)	126-002	126-133	54	27	
SR 126 (RURAL)	126-136	126-343	74	0	
TOTAL SR 126			**128**	**27**	**21.1%**
SR 150 (RURAL)	150-002	150-312	23	0	
TOTAL SR 150			**23**	**0**	**0.0%**
TOTAL SAFE			**563**	**124**	**22.0%**

Table 4: Removal Recommendations

Adopting Scenario 1 (0.5 mile Rural spacing) achieves the preferred system reduction of under 25%, while providing greater call box presence in rural areas where less assistance from other motorists and roadside resources would be available. Urban site removals would occur primarily in high traffic volume segments of US 101 and SR 126. Because the recommended removals exceed 10% of the total existing sites along those corridors, both CHP and Caltrans must approve the Site Removal Project under the requirements of the Guidelines before actual removals may commence.

Accessibility

Once the preferred spacing parameters have been approved by the Ventura SAFE Board (and while under review by CHP and Caltrans), SAFE Staff, with assistance from T-Cubed, can begin selecting specific call box sites for permanent removal within those spacing parameters. In order to make those selections in a cost-effective manner, sites that currently meet generally accepted accessibility guidelines should be retained as much as possible, while sites that require physical changes to site design to become more accessible for persons with mobility

disabilities should be selected for permanent removal as much as possible. Removing the latter sites would avoid both the cost of the technology upgrade and the cost to perform appropriate site accessibility modifications.

The desk review and field survey identified 340 sites that are fully accessible (28%] and 871 sites for which site modifications would be appropriate (72%). One site could be relocated nearby.

Tables 5 and 6 above present the analysis of call box sites for accessibility status by Site Type and by Highway segment. Note that a preliminary categorization as a removal candidate does not mean that the call box is recommended for removal, or that a call box categorized as "leave in place" would ultimately be left in place. Rather, SAFE Staff and T-Cubed will use these categorizations as an important factor in selecting sites within the proposed spacing interval to best avoid the technology upgrade and site retrofit costs. It will be necessary in some cases to perform such retrofits on sites with limited accessibility in order to maintain the preferred spacing interval.

Site Type	Leave in Place		Remove		TOTAL	
	Count	Percent	Count	Percent	Count	Percent
A/HR: At Grade w/Handrail	0	0%	28	14%	28	5%
A: At Grade	0	0%	130	66%	130	23%
D: On Retaining Wall	14	4%	1	1%	15	3%
E: Behind Barrier Rail	1	0%	0	0%	1	0%
F: Behind Guard Rail	88	24%	7	4%	95	17%
G: On Paved Median	2	1%	5	3%	7	1%
H: On top of Barrier	1	0%	0	0%	1	0%
L: with Curb	183	50%	13	7%	196	35%
M: No Curb	76	21%	14	7%	90	16%
TOTALS	365	65%	198	35%	563	100

Table 5: Accessibility Evaluations by Site Type

Highway	Leave in Place		Remove		TOTAL	
	Count	Percent	Count	Percent	Count	Percent
1	29	8%	30	15%	59	10%
23	32	9%	11	6%	43	8%
33	20	5%	4	2%	24	4%
34	0	0%	3	2%	3	1%
101	118	32%	86	43%	204	36%
118	64	18%	15	8%	79	14%
126	93	25%	35	18%	128	23%
150	9	2%	14	7%	23	4%
TOTALS	365	65%	198	35%	563	100%

Table 6: Accessibility Evaluations by Highway

Temporary Removals

Of the 563 call box sites in the Ventura SAFE system, approximately 40 sites are temporarily removed because of Caltrans highway construction. While Temporary Removals are spread throughout the system, they are primarily along several

segments of US 101. To the extent that these sites can be selected for permanent removals, while maintaining desired spacing, the Ventura SAFE can save the removal costs of $350 per box, in addition to saving equipment upgrade and site accessibility costs.

Recommended Site Solutions

As a final step, T-Cubed applied the Spacing, Accessibility and Temporary Removal analyses discussed above to each site in the Ventura SAFE call box system. The resulting recommendations are presented in Appendix 1, and are summarized as follows:

Removal Plan Recommendations	Technology Upgrade Cost	Site Modification Cost	Unit Cost	Count	Total
Already Removed	$0	$0	$0	21	**$0**
Remove	$0	$350	$350	152	**$53,200**
Leave in Place	$800	$0	$800	268	**$214,400**
Retrofit	$800	$1,700	$2,500	122	**$305,000**
Total					**$572,600**

Table 7: Final Recommendations

Of the 563 call box sites, 173 sites are recommended for permanent removal (including 21 sites previously removed as Temporary Removals). That amounts to a recommended removal of approximately 27% of existing call boxes (31% overall). This is slightly higher than the 22% estimated based solely on spacing, but remains close to the 25% removal goal established by Ventura SAFE Staff.

Life Cycle Cost Analysis

Should the Ventura SAFE Board adopt the recommended permanent removals, and implement the complete System Modernization Project (with the concurrence of the oversight agencies), the projected Fiscal Impact over five years would be as follows:

System Modernization Plan Estimated 5-Year Life Cycle Costs				
Expenditure/Savings	**Unit Cost**	**# Sites**	**Months**	**Total**
CURRENT SYSTEM				
3G Technology Upgrade	$800.00	563	N/A	$450,400
Call Box Maintenance Costs (5 year)[1]	$35.00	563	60	$1,182,300
Cellular Service (5 year)	$6.50	563	60	$219,570
Total 5 Year Costs for Current System	**$1,852,270**			

[1] Based upon existing CASE Systems, Inc. maintenance contract, which ends on June 30, 2015. Maintenance costs thereafter will be determined through a noticed public procurement.

System Modernization Plan Estimated 5-Year Life Cycle Costs				
Expenditure/Savings	**Unit Cost**	**# Sites**	**Months**	**Total**
AFTER SYSTEM MODERNIZATION PROJECT (INCLUDING REMOVALS)				
3G Technology Upgrade Costs	$800	390	N/A	$312,000
Site Retrofit (Accessibility) Costs to Achieve Desired Spacing	$800	122	N/A	$97,600
Permanent Removal Costs to Achieve Desired Spacing	$350	152	N/A	$53,200
Call Box Maintenance Costs	$35.00	390	60	$819,000
Cellular Service Costs (new contract)	$0.50	390	60	$11,700
Total 5 Year Costs after SMP	**$1,293,500**			

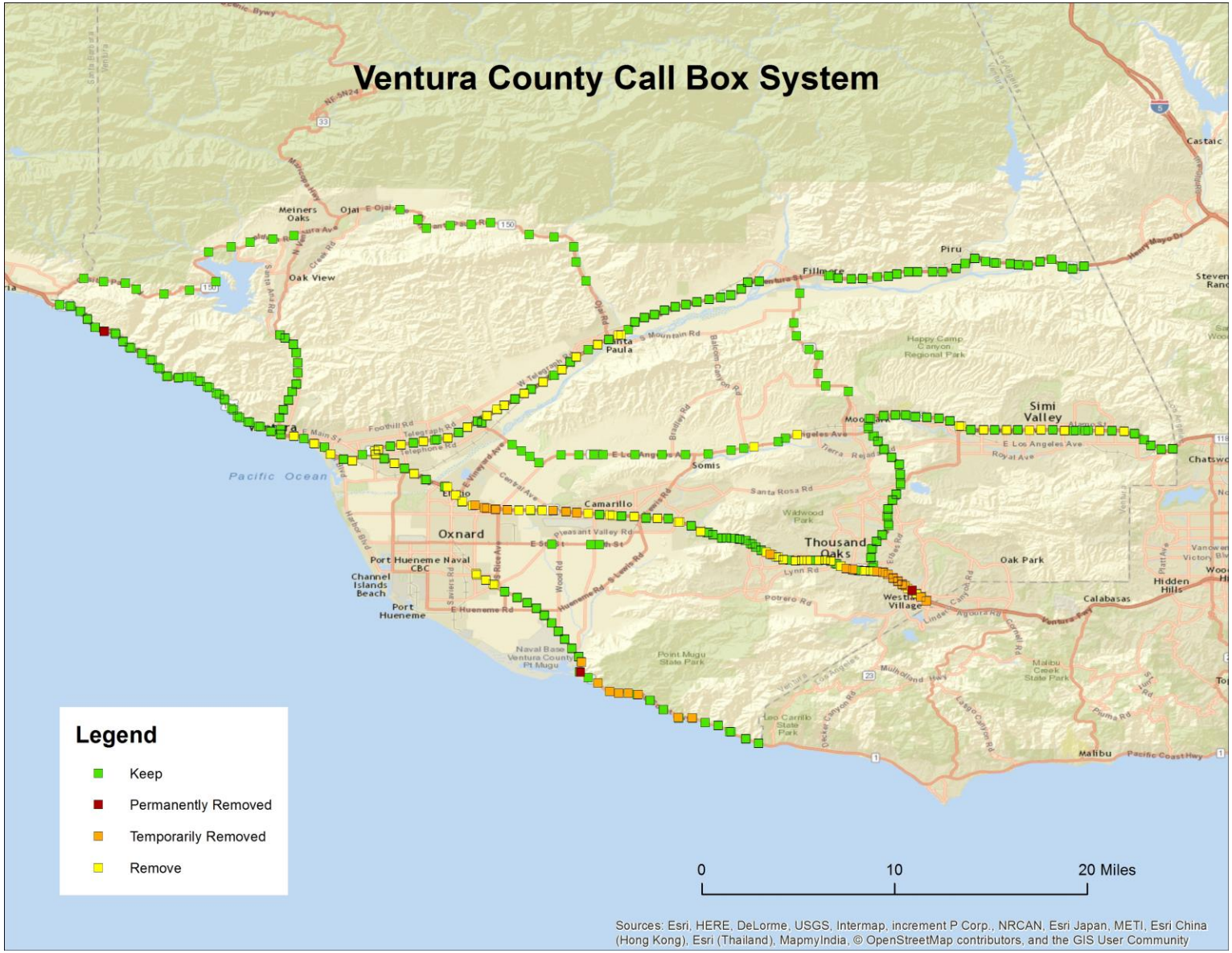
5 YEAR SAVINGS	**$558,770**

As noted above, the cost to upgrade the entire existing call box system with the 3G upgrade kits at $800 each would be approximately $540,480. By implementing the permanent removal of 152 call boxes, as recommended herein, the estimated cost for that 3G upgrade would be reduced by $138,400, or 26%. Additional costs for site retrofits are estimated at $97,600. These latter costs would be required to retrofit sites recommended for retention, but which need enhanced accessibility. The additional costs also include costs to permanently remove 152 current sites.

By selecting the WSCA3 cellular service plan from either AT&T or Verizon, the Ventura SAFE would save nearly $54,000 over a five-year life cycle when compared with the current AT&T plan.

For budgeting purposes, the Ventura SAFE may wish to increase the costs for site retrofit and site removals to include a contingency amount such as 10% or 20%, as the exact number of sites that will require these actions will not be known until the retrofit contractor and SAFE Staff make final field observations.

Appendix A


Ventura County Call Box System
Legend
Keep
Permanently Removed
Temporarily Removed
Remove
0
10
20 Miles
Pacific Ocean
Oxnard
Camarillo
Thousand Oaks
Simi Valley
Port Hueneme
Channel Islands Beach
Port Hueneme Naval CBC
Somis
Santa Paula
Fillmore
Piru
Ojai
Meiners Oaks
Oak View
Oak Park
Calabasas
Hidden Hills
Malibu
Westlake Village
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Appendix A

[Color-coded for convenience]

VE-001-0002	Leave in Place
VE-001-0003	Retrofit
VE-001-0006	Leave in Place
VE-001-0007	Leave in Place
VE-001-0016	Retrofit
VE-001-0017	Retrofit
VE-001-0022	Retrofit
VE-001-0023	Retrofit
VE-001-0026	Retrofit
VE-001-0027	Retrofit
VE-001-0034	Remove
VE-001-0035	Retrofit
VE-001-0038	Remove
VE-001-0039	Leave in Place
VE-001-0048	Retrofit
VE-001-0049	Retrofit
VE-001-0056	Retrofit
VE-001-0057	Retrofit
VE-001-0062	Remove
VE-001-0063	Retrofit
VE-001-0066	Remove
VE-001-0067	Retrofit
VE-001-0072	Remove
VE-001-0073	Retrofit
VE-001-0076	Remove
VE-001-0077	Retrofit
VE-001-0082	Remove
VE-001-0083	Retrofit
VE-001-0087	Retrofit
VE-001-0092	Remove
VE-001-0093	Retrofit
VE-001-0096	Remove
VE-001-0097	Retrofit
VE-001-0102	Retrofit
VE-001-0103	Retrofit
VE-001-0106	Leave in Place
VE-001-0107	Leave in Place
VE-001-0112	Retrofit
VE-001-0113	Leave in Place
VE-001-0116	Retrofit
VE-001-0117	Leave in Place
VE-001-0122	Leave in Place
VE-001-0123	Leave in Place
VE-001-0126	Leave in Place
VE-001-0127	Leave in Place
VE-001-0132	Leave in Place
VE-001-0133	Leave in Place
VE-001-0136	Leave in Place
VE-001-0137	Leave in Place
VE-001-0142	Leave in Place
VE-001-0143	Leave in Place
VE-001-0146	Retrofit
VE-001-0147	Leave in Place
VE-001-0152	Remove
VE-001-0153	Remove
VE-001-0156	Remove
VE-001-0157	Remove
VE-001-0162	Remove
VE-001-0163	Remove
VE-023-0032T	Retrofit
VE-023-0036T	Leave in Place
VE-023-0037T	Leave in Place
VE-023-0042	Leave in Place
VE-023-0043	Leave in Place
VE-023-0046	Leave in Place
VE-023-0047	Leave in Place
VE-023-0052	Leave in Place
VE-023-0053	Leave in Place
VE-023-0056	Leave in Place
VE-023-0057	Leave in Place
VE-023-0062	Leave in Place
VE-023-0063	Leave in Place
VE-023-0066	Leave in Place
VE-023-0067	Leave in Place
VE-023-0072	Leave in Place
VE-023-0073	Leave in Place
VE-023-0076	Leave in Place
VE-023-0077	Leave in Place
VE-023-0082	Leave in Place
VE-023-0083	Retrofit
VE-023-0086	Leave in Place
VE-023-0087	Leave in Place
VE-023-0092	Leave in Place
VE-023-0093	Leave in Place
VE-023-0096	Leave in Place
VE-023-0097	Leave in Place
VE-023-0102	Leave in Place
VE-023-0103	Leave in Place
VE-023-0106	Leave in Place
VE-023-0107	Leave in Place
VE-023-0112	Retrofit
VE-023-0113	Leave in Place
VE-023-0116	Leave in Place
VE-023-0117	Leave in Place
VE-023-0153	Retrofit

Appendix A

VE-023-0165	Retrofit
VE-023-0175	Retrofit
VE-023-0186	Leave in Place
VE-023-0196	Leave in Place
VE-023-0209	Leave in Place
VE-023-0219	Retrofit
VE-023-0233	Leave in Place
VE-033-0002T	Leave in Place
VE-033-0003T	Leave in Place
VE-033-0012	Leave in Place
VE-033-0013	Leave in Place
VE-033-0016	Leave in Place
VE-033-0017	Retrofit
VE-033-0022	Leave in Place
VE-033-0023	Leave in Place
VE-033-0026	Leave in Place
VE-033-0027	Leave in Place
VE-033-0032	Retrofit
VE-033-0033	Leave in Place
VE-033-0036	Leave in Place
VE-033-0037	Leave in Place
VE-033-0042	Leave in Place
VE-033-0043	Leave in Place
VE-033-0046	Leave in Place
VE-033-0047	Leave in Place
VE-033-0052	Leave in Place
VE-033-0053	Leave in Place
VE-033-0056	Leave in Place
VE-033-0057	Leave in Place
VE-033-0062	Leave in Place
VE-033-0063	Retrofit
VE-034-0086	Retrofit
VE-034-0102	Retrofit
VE-034-0105	Retrofit
VE-101-0004	Remove
VE-101-0005	Remove
VE-101-0006	Retrofit
VE-101-0007	Leave in Place
VE-101-0008	Remove
VE-101-0009	Remove
VE-101-0012	Remove
VE-101-0013	Remove
VE-101-0014	Remove
VE-101-0015	Remove
VE-101-0016	Leave in Place
VE-101-0017	Leave in Place
VE-101-0018	Remove
VE-101-0019	Remove
VE-101-0022	Remove
VE-101-0023	Remove
VE-101-0024	Remove
VE-101-0025	Remove
VE-101-0027	Remove
VE-101-0028	Retrofit
VE-101-0029	Retrofit
VE-101-0032	Remove
VE-101-0033	Remove
VE-101-0034	Remove
VE-101-0035	Remove
VE-101-0036	Leave in Place
VE-101-0037	Leave in Place
VE-101-0038	Remove
VE-101-0039	Remove
VE-101-0042	Remove
VE-101-0043	Remove
VE-101-0044	Remove
VE-101-0045	Remove
VE-101-0046	Leave in Place
VE-101-0047	Leave in Place
VE-101-0048	Remove
VE-101-0049	Remove
VE-101-0052	Remove
VE-101-0053	Remove
VE-101-0054	Remove
VE-101-0055	Remove
VE-101-0056	Leave in Place
VE-101-0057	Leave in Place
VE-101-0058	Remove
VE-101-0059	Remove
VE-101-0062	Remove
VE-101-0063	Remove
VE-101-0064	Remove
VE-101-0065	Remove
VE-101-0066	Leave in Place
VE-101-0067	Leave in Place
VE-101-0068	Remove
VE-101-0069	Remove
VE-101-0072	Remove
VE-101-0073	Remove
VE-101-0074	Remove
VE-101-0075	Remove
VE-101-0076	Leave in Place
VE-101-0077	Retrofit
VE-101-0078	Retrofit
VE-101-0079	Leave in Place
VE-101-0082	Retrofit

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VE-101-0083	Leave in Place
VE-101-0084	Leave in Place
VE-101-0085	Leave in Place
VE-101-0086	Retrofit
VE-101-0087	Leave in Place
VE-101-0094	Leave in Place
VE-101-0095	Retrofit
VE-101-0096	Leave in Place
VE-101-0097	Retrofit
VE-101-0098	Retrofit
VE-101-0099	Leave in Place
VE-101-0102	Retrofit
VE-101-0103	Leave in Place
VE-101-0106	Retrofit
VE-101-0107	Leave in Place
VE-101-0108	Retrofit
VE-101-0109	Leave in Place
VE-101-0112	Remove
VE-101-0113	Remove
VE-101-0116	Leave in Place
VE-101-0117	Leave in Place
VE-101-0122	Remove
VE-101-0123	Remove
VE-101-0126	Leave in Place
VE-101-0127	Leave in Place
VE-101-0132	Remove
VE-101-0133	Remove
VE-101-0136	Leave in Place
VE-101-0137	Leave in Place
VE-101-0142	Remove
VE-101-0143	Remove
VE-101-0146	Retrofit

VE-101-0147	Leave in Place
VE-101-0152	Remove
VE-101-0153	Remove
VE-101-0156	Retrofit
VE-101-0157	Leave in Place
VE-101-0162	Remove
VE-101-0163	Remove
VE-101-0166	Leave in Place
VE-101-0167	Leave in Place
VE-101-0172	Remove
VE-101-0173	Remove
VE-101-0176	Retrofit
VE-101-0177	Retrofit
VE-101-0182	Remove
VE-101-0183	Remove
VE-101-0186	Leave in Place
VE-101-0187	Leave in Place
VE-101-0192	Remove
VE-101-0193	Remove
VE-101-0196	Retrofit
VE-101-0197	Retrofit
VE-101-0202	Remove
VE-101-0203	Remove
VE-101-0206	Retrofit
VE-101-0207	Retrofit
VE-101-0212	Remove
VE-101-0213	Remove
VE-101-0216	Leave in Place
VE-101-0217	Leave in Place
VE-101-0222	Remove
VE-101-0223	Remove
VE-101-0226	Leave in Place

VE-101-0227	Leave in Place
VE-101-0236	Leave in Place
VE-101-0237	Leave in Place
VE-101-0242	Remove
VE-101-0243	Remove
VE-101-0246	Leave in Place
VE-101-0247	Leave in Place
VE-101-0252	Remove
VE-101-0253	Remove
VE-101-0256	Leave in Place
VE-101-0257	Leave in Place
VE-101-0262	Remove
VE-101-0263	Remove
VE-101-0266	Leave in Place
VE-101-0267	Leave in Place
VE-101-0272	Remove
VE-101-0273	Remove
VE-101-0276	Leave in Place
VE-101-0277	Leave in Place
VE-101-0282	Remove
VE-101-0283	Remove
VE-101-0286	Leave in Place
VE-101-0287	Leave in Place
VE-101-0292	Remove
VE-101-0293	Remove
VE-101-0296	Leave in Place
VE-101-0297	Leave in Place
VE-101-0302	Remove
VE-101-0303	Remove
VE-101-0306	Leave in Place
VE-101-0307	Retrofit
VE-101-0312	Leave in Place

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VE-101-0313	Leave in Place
VE-101-0322	Leave in Place
VE-101-0323	Leave in Place
VE-101-0326	Leave in Place
VE-101-0327	Leave in Place
VE-101-0332	Retrofit
VE-101-0333	Retrofit
VE-101-0336	Retrofit
VE-101-0337	Leave in Place
VE-101-0342	Retrofit
VE-101-0343	Leave in Place
VE-101-0346	Leave in Place
VE-101-0347	Leave in Place
VE-101-0352	Leave in Place
VE-101-0353	Leave in Place
VE-101-0356	Leave in Place
VE-101-0357	Leave in Place
VE-101-0362	Retrofit
VE-101-0363	Leave in Place
VE-101-0366	Leave in Place
VE-101-0367	Leave in Place
VE-101-0372	Leave in Place
VE-101-0373	Leave in Place
VE-101-0376	Retrofit
VE-101-0377	Retrofit
VE-101-0382	Retrofit
VE-101-0383	Retrofit
VE-101-0386	Leave in Place
VE-101-0387	Leave in Place
VE-101-0392	Leave in Place
VE-101-0393	Retrofit
VE-101-0396	Leave in Place
VE-101-0397	Leave in Place
VE-101-0402	Leave in Place
VE-101-0403	Retrofit
VE-101-0403W	Leave in Place
VE-101-0406	Leave in Place
VE-101-0407	Remove
VE-101-0412	Leave in Place
VE-101-0413	Leave in Place
VE-101-0413W	Leave in Place
VE-101-0416	Leave in Place
VE-101-0417	Leave in Place
VE-101-0417W	Leave in Place
VE-101-0422	Leave in Place
VE-101-0423	Leave in Place
VE-101-0423W	Leave in Place
VE-101-0426	Leave in Place
VE-101-0427	Leave in Place
VE-101-0427W	Leave in Place
VE-101-0432	Leave in Place
VE-101-0433	Leave in Place
VE-101-0433W	Leave in Place
VE-118-0002	Leave in Place
VE-118-0003	Leave in Place
VE-118-0026	Retrofit
VE-118-0032	Retrofit
VE-118-0036	Retrofit
VE-118-0042	Retrofit
VE-118-0052	Leave in Place
VE-118-0058	Leave in Place
VE-118-0066	Retrofit
VE-118-0068	Leave in Place
VE-118-0084	Leave in Place
VE-118-0096	Leave in Place
VE-118-0106	Retrofit
VE-118-0116	Retrofit
VE-118-0126	Leave in Place
VE-118-0133	Leave in Place
VE-118-0136	Remove
VE-118-0143	Leave in Place
VE-118-0147	Leave in Place
VE-118-0153	Leave in Place
VE-118-0156	Remove
VE-118-0186	Leave in Place
VE-118-0187	Leave in Place
VE-118-0192	Leave in Place
VE-118-0193	Leave in Place
VE-118-0196	Leave in Place
VE-118-0197	Leave in Place
VE-118-0202	Leave in Place
VE-118-0203	Leave in Place
VE-118-0206	Retrofit
VE-118-0207	Leave in Place
VE-118-0212	Leave in Place
VE-118-0213	Retrofit
VE-118-0216	Leave in Place
VE-118-0217	Leave in Place
VE-118-0222	Retrofit
VE-118-0223	Retrofit
VE-118-0226	Leave in Place
VE-118-0227	Retrofit
VE-118-0232	Remove
VE-118-0233	Remove
VE-118-0236	Leave in Place
VE-118-0237	Leave in Place

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VE-118-0242	Remove
VE-118-0243	Remove
VE-118-0246	Leave in Place
VE-118-0247	Leave in Place
VE-118-0252	Remove
VE-118-0253	Remove
VE-118-0256	Leave in Place
VE-118-0257	Leave in Place
VE-118-0262	Remove
VE-118-0263	Remove
VE-118-0266	Leave in Place
VE-118-0267	Leave in Place
VE-118-0272	Leave in Place
VE-118-0273	Leave in Place
VE-118-0276	Remove
VE-118-0277	Remove
VE-118-0282	Leave in Place
VE-118-0283	Leave in Place
VE-118-0286	Leave in Place
VE-118-0287	Leave in Place
VE-118-0292	Remove
VE-118-0293	Remove
VE-118-0296	Leave in Place
VE-118-0297	Leave in Place
VE-118-0302	Remove
VE-118-0303	Remove
VE-118-0306	Leave in Place
VE-118-0307	Leave in Place
VE-118-0312	Leave in Place
VE-118-0313	Leave in Place
VE-118-0316	Leave in Place
VE-118-0317	Leave in Place
VE-118-0322	Leave in Place
VE-118-0323	Leave in Place
VE-118-0326	Leave in Place
VE-118-0327	Leave in Place
VE-126-0002	Remove
VE-126-0003	Remove
VE-126-0006	Remove
VE-126-0007	Remove
VE-126-0012	Leave in Place
VE-126-0013	Leave in Place
VE-126-0016	Remove
VE-126-0017	Remove
VE-126-0022	Leave in Place
VE-126-0023	Leave in Place
VE-126-0026	Remove
VE-126-0027	Remove
VE-126-0032	Leave in Place
VE-126-0033	Leave in Place
VE-126-0036	Remove
VE-126-0037	Remove
VE-126-0042	Retrofit
VE-126-0043	Leave in Place
VE-126-0046	Remove
VE-126-0047	Remove
VE-126-0052	Leave in Place
VE-126-0053	Leave in Place
VE-126-0056	Remove
VE-126-0057	Remove
VE-126-0062	Leave in Place
VE-126-0063	Leave in Place
VE-126-0066	Remove
VE-126-0067	Remove
VE-126-0072	Leave in Place
VE-126-0073	Leave in Place
VE-126-0076	Remove
VE-126-0077	Remove
VE-126-0082	Leave in Place
VE-126-0083	Leave in Place
VE-126-0086	Remove
VE-126-0087	Remove
VE-126-0092	Leave in Place
VE-126-0093	Leave in Place
VE-126-0096	Remove
VE-126-0097	Remove
VE-126-0102	Leave in Place
VE-126-0103	Leave in Place
VE-126-0106	Remove
VE-126-0107	Remove
VE-126-0112	Leave in Place
VE-126-0113	Leave in Place
VE-126-0116	Remove
VE-126-0117	Remove
VE-126-0122	Leave in Place
VE-126-0123	Leave in Place
VE-126-0126	Remove
VE-126-0127	Remove
VE-126-0132	Leave in Place
VE-126-0133	Leave in Place
VE-126-0136	Leave in Place
VE-126-0137	Leave in Place
VE-126-0142	Retrofit
VE-126-0143	Leave in Place
VE-126-0146	Leave in Place
VE-126-0147	Leave in Place

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VE-126-0152	Leave in Place
VE-126-0153	Leave in Place
VE-126-0156	Retrofit
VE-126-0157	Leave in Place
VE-126-0162	Leave in Place
VE-126-0163	Leave in Place
VE-126-0166	Leave in Place
VE-126-0167	Leave in Place
VE-126-0172	Leave in Place
VE-126-0173	Leave in Place
VE-126-0176	Leave in Place
VE-126-0177	Leave in Place
VE-126-0178	Leave in Place
VE-126-0179	Leave in Place
VE-126-0186	Leave in Place
VE-126-0187	Leave in Place
VE-126-0192	Leave in Place
VE-126-0193	Retrofit
VE-126-0196	Leave in Place
VE-126-0197	Leave in Place
VE-126-0226	Retrofit
VE-126-0227	Retrofit
VE-126-0232	Leave in Place
VE-126-0233	Retrofit
VE-126-0236	Leave in Place
VE-126-0237	Retrofit
VE-126-0242	Leave in Place
VE-126-0243	Retrofit
VE-126-0246	Leave in Place
VE-126-0247	Retrofit
VE-126-0252	Retrofit
VE-126-0253	Leave in Place
VE-126-0256	Retrofit
VE-126-0257	Retrofit
VE-126-0262	Retrofit
VE-126-0263	Retrofit
VE-126-0266	Leave in Place
VE-126-0267	Leave in Place
VE-126-0272	Retrofit
VE-126-0273	Retrofit
VE-126-0276	Leave in Place
VE-126-0277	Leave in Place
VE-126-0282	Leave in Place
VE-126-0283	Leave in Place
VE-126-0286	Leave in Place
VE-126-0287	Retrofit
VE-126-0292	Leave in Place
VE-126-0293	Leave in Place
VE-126-0296	Leave in Place
VE-126-0297	Leave in Place
VE-126-0302	Retrofit
VE-126-0303	Retrofit
VE-126-0306	Leave in Place
VE-126-0307	Retrofit
VE-126-0312	Leave in Place
VE-126-0313	Leave in Place
VE-126-0316	Leave in Place
VE-126-0317	Leave in Place
VE-126-0322	Retrofit
VE-126-0323	Retrofit
VE-126-0326	Leave in Place
VE-126-0327	Retrofit
VE-126-0332	Leave in Place
VE-126-0333	Retrofit
VE-126-0336	Leave in Place
VE-126-0337	Leave in Place
VE-126-0342	Retrofit
VE-126-0343	Retrofit
VE-150-0002	Retrofit
VE-150-0007	Retrofit
VE-150-0018	Retrofit
VE-150-0026	Retrofit
VE-150-0042	Retrofit
VE-150-0058	Retrofit
VE-150-0076	Retrofit
VE-150-0097	Retrofit
VE-150-0108	Retrofit
VE-150-0119	Retrofit
VE-150-0131	Retrofit
VE-150-0141	Leave in Place
VE-150-0192	Retrofit
VE-150-0212	Leave in Place
VE-150-0221	Retrofit
VE-150-0232	Retrofit
VE-150-0241	Retrofit
VE-150-0249	Retrofit
VE-150-0267	Leave in Place
VE-150-0283	Retrofit
VE-150-0293	Retrofit
VE-150-0302	Retrofit
VE-150-0312	Retrofit

Appendix B

CASE PRICING - Call Box Removals (active call boxes)

Call Box Site Type	ACTIVE call boxes to remove	Price	Total
A	28	$950	$26,600
D	4	$800	$3,200
F	18	$750	$13,500
L	52	$550	$28,600
M	14	$550	$7,700
TOTALS	116		$79,600

System Modernization Plan Estimated 5-Year Life Cycle Cost Analysis

CURRENT SYSTEM (IF NO REMOVALS)				
Expenditure/Savings	**Unit Cost**	**# of Call Boxes**	**Months**	**Total**
3G Technology Upgrade Costs	$800	570	N/A	$456,000
Call Box Maintenance Costs (5 year)	$35	570	60	$1,197,000
Cellular Service Costs (5 year)	$6.50	570	60	$222,300
Total 5 Year Costs for Current System		570		$1,875,300
AFTER SYSTEM MODERNIZATION PROJECT				
Expenditure/Savings	**Unit Cost**	**# of Call Boxes**	**Months**	**Total**
Permanent Removal Costs	See CASE Pricing	116	NA	$79,600
3G Technology Upgrade Costs	$800	429	NA	$343,200
Call Box Maintenance Costs	$35	429	60	$900,900
Cellular Service Costs	$6.50	429	60	$167,310
Total 5 Year Costs After System Modernization				$1,491,010
			COST OF CURRENT SYSTEM (IF NO REMOVALS)	$1,875,300
			COST OF SYSTEM WITH MODERNIZATION PROJECT	$1,491,010
			5 year savings (With Modernization Project)	$384,290