

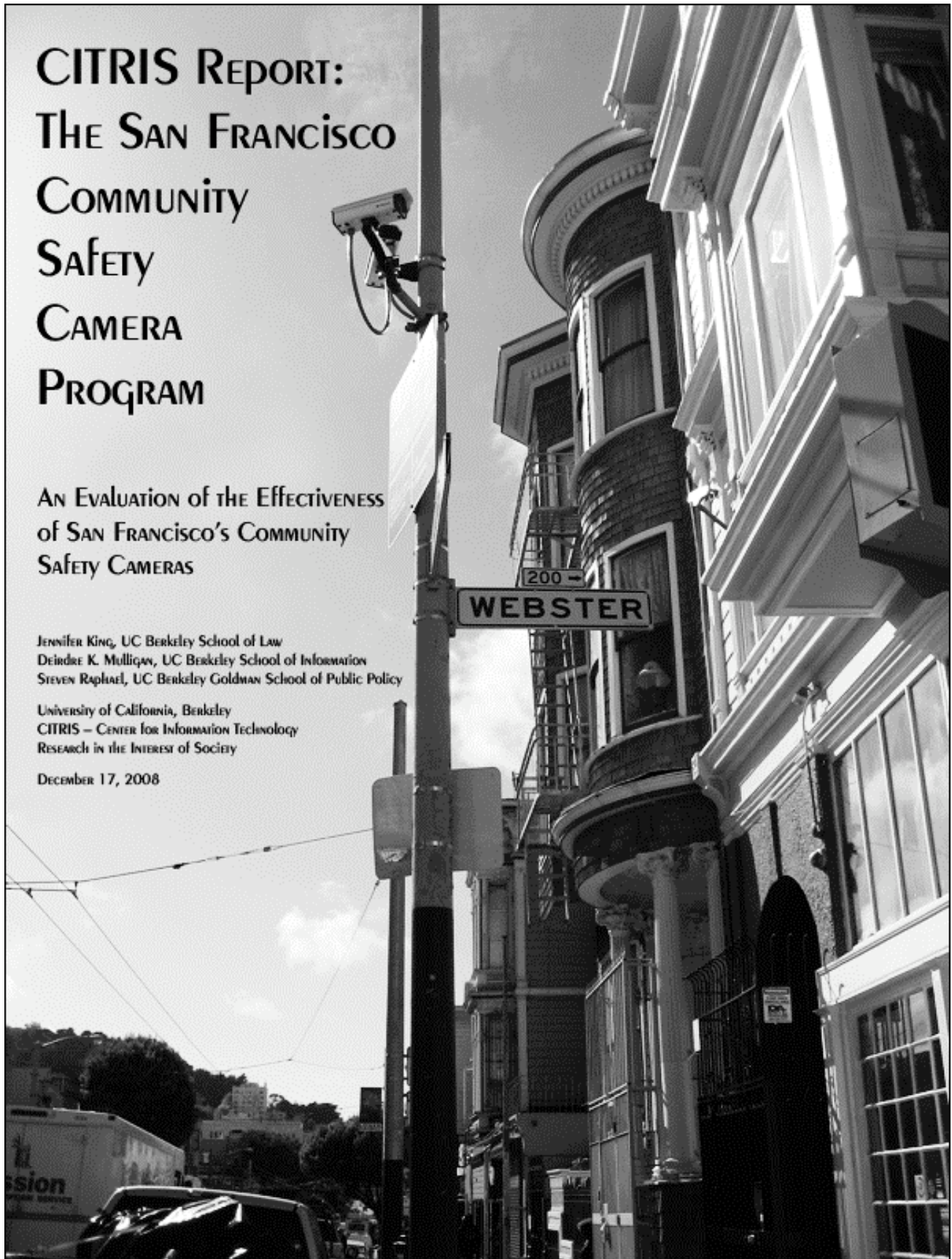
# CITRIS REPORT: THE SAN FRANCISCO COMMUNITY SAFETY CAMERA PROGRAM

AN EVALUATION OF THE EFFECTIVENESS  
OF SAN FRANCISCO'S COMMUNITY  
SAFETY CAMERAS

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## Overview

This study evaluates the effectiveness of the City of San Francisco's Community Safety Camera (CSC) program. Chapter 1 describes the origins of the CSC program and the City of San Francisco's primary and secondary policy objectives for it, as expressed in the statements, technical choices, policies, and practices made by the Mayor's Office, the City's Board of Supervisors, the Police Commission, the San Francisco Police Department, and other entities and individuals that have played key roles in shaping the program as it exists today. Chapter 2 provides an empirical analysis of the CSC program's effectiveness in deterring crime, particularly violent crime. Chapter 3 analyzes the effectiveness of the CSC program as a investigatory and evidentiary tool, and considers the program's effectiveness in supporting the secondary objectives of facilitating community participation, oversight and accountability, and the protection of privacy and related interests. Chapter 4 considers the managerial and technical aspects of the system that span all objectives, based on our findings. Chapter 5 provides guidance and recommendations to the City for the CSC program based on its current objectives, and offers preliminary thoughts on possible alternatives the City may consider for the program.

## Executive Summary



**Figure ES-1: Community Safety Camera and Notice on Buchanan St. in the Western Addition**

### Scope of the CITRIS Report

In March 2008, the City of San Francisco commissioned an interdisciplinary team of University of California (UC) Berkeley researchers<sup>1</sup> through the University of California's CITRIS (The Center for Information Technology Research in the Interest of Society)<sup>2</sup> to conduct a six-month study of the City's Community Safety Camera (CSC) program. This document represents the research team's final report and supercedes the findings of a preliminary report issued by this team in mid-March 2008.

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<sup>1</sup> Jennifer King, Research Specialist, Samuelson Law, Technology, & Public Policy Clinic, UC Berkeley School of Law; Professor Deirdre Mulligan, UC Berkeley School of Information; Professor Steven Raphael, UC Berkeley Goldman School of Public Policy.

<sup>2</sup> Information available at [www.citris-uc.org](http://www.citris-uc.org).

The request to evaluate the City's seventy-one Community Safety Cameras came from the San Francisco Police Commission, the governmental body charged with primary oversight over the program, and was called for in the Ordinance passed by the City's Board of Supervisors in 2006, codifying the CSC program and requiring its annual evaluation, including an analysis of "camera locations, the crime statistics for the vicinity surrounding each camera both before and after the camera is installed, crime statistics from surrounding vicinities, the number of times the SFPD requested copies of the recorded images, the number of times the images were used to bring criminal charges, the types of charges brought, and the results of the charges." The Board of Supervisors authorized this report to fulfill the Ordinance requirement.

This study provides a comprehensive evaluation of the CSC program's effectiveness. The approach is unlike any evaluation of municipally owned criminal video surveillance systems conducted in the United States to date, and is both broader and deeper than our March preliminary report, which focused only on an initial analysis of crime statistics. The evaluation takes a multifaceted empirical approach to examining the system's effectiveness, combining policy, technological, and management analysis with a quasi-experimental evaluation of criminal incident data to provide a comprehensive understanding of the myriad factors that have influenced system operations and efficacy. The research team used the following sources and methods:

- Document analysis, including the Municipal Ordinance governing the CSC program, documents and data provided by City agencies regarding the camera systems specifications, management, policies, and procedures, and documents published to the SFGov.org website
- Interviews with over thirty program stakeholders and end-users
- Review of minutes and video recordings of public hearings
- Review of relevant press releases and news articles
- Site visits conducted with the cities of Los Angeles and Chicago for comparative insights, in addition to previous site visits conducted by CITRIS researchers
- Empirical and quasi-experimental statistical analysis of 59,706 crime incident reports dated January 1, 2005 and January 28, 2008



By employing multiple, cross-discipline methods to examine the CSC program, the CITRIS team determined the program's efficacy in relation to the City's goals for the program. Per our analysis of the information sources we have listed, the primary CSC program goals are to deter crime, particularly violent crime, and to provide San Francisco police investigators with forensic evidence to assist in the investigation of crimes committed within view of the Community Safety Cameras. We should note that while the focus on violent crime was not to the exclusion of other forms of crime, our investigation does reveal it to be a primary focus of the program. These information sources also reveal several second-order<sup>3</sup> objectives that both inform and constrain the City in its pursuit of the primary objectives. These secondary objectives include fostering community participation in decisions about the CSC program, facilitating public oversight and accountability of program use and effectiveness, and minimizing intrusions on personal privacy and related interests.

The findings presented here are limited to the efficacy of the CSC program; they do not include any other camera systems, public or private, in operation within the City of San Francisco. Furthermore, while this report attempts to offer suggestions both for improving the existing system as well as for other strategic approaches the City may consider, it focuses primarily on issues that influenced the *effectiveness* of the current CSC program. For example, the report identifies several issues related to the technical configuration of the system and includes suggestions for improving it, but makes no specific hardware purchasing suggestions because that level of detail exceeds the scope of our investigation. Furthermore, while we are aware that many of the suggestions made in this report have significant budgetary impact, providing possible costs or an evaluation of budget impact is also outside the scope of this project. While San Francisco may seek additional information, we are optimistic that this report will provide substantial assistance as the City makes decisions about the future of the CSC program and other existing and potential uses of public video surveillance cameras.

Finally, where possible we have included information on best practices as well as data from other U.S. municipalities to provide a limited basis of comparison; this information is based both on site visits conducted for this study as well as previous research conducted by the CITRIS team. However, to date there is no state or federal legislation governing the use in the United States of video surveillance systems like the CSC program, and there is only limited data available about other cities' use of, and

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<sup>3</sup> Secondary in this context does not convey any absolute sense of the rank importance of the values or objectives. Rather, it is meant to reflect the fact that the CSC program was not instituted as a means of advancing these secondary objectives but had to attend to these objectives while attempting to pursue its primary missions of deterring and investigating crime.

experience with, video surveillance systems.<sup>4</sup> While some industry and public interest organizations have issued guidelines related to public video surveillance, none currently cover the entire spectrum of system usage issues; some guidelines relate specifically to legal issues, others to employee policies and procedures, and none to our knowledge attempt to set “performance goals” to help evaluate whether or not a system “works.” As this report argues, the efficacy of public video surveillance is extremely context dependent and also relies largely upon the goals of the entity deploying the system; there is no singular objective measure by which a system can be evaluated, a key reason why such evaluations are difficult to perform.

## **Contents of the Report**

The report consists of five chapters and two appendices:

- Chapter 1 provides an overview of the CSC program and establishes the program’s goals, which are used as a basis for guiding the evaluation.
- Chapter 2 presents the detailed findings of the program’s crime deterrence goals based on empirical analysis of criminal incident report data and quasi-experimental comparative analysis. The methods used to conduct these analyses are explained.
- Chapter 3 presents the findings from analysis of the program’s investigatory goal and secondary goals.
- Chapter 4 presents the findings from the management analysis and technical evaluation.
- Chapter 5 presents recommendations for each of the areas outlined in the preceding chapters with the goal of improving the existing program; suggestions for future directions, including the use of actively monitored cameras, are also discussed.
- Appendix 1 provides an overview of the criminological theory that seeks to explain how video surveillance deters crime.
- Appendix 2 gives a comprehensive overview of the technical components of the CSC system, including an analysis of the network structure and current hardware configuration.

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<sup>4</sup> While some cities have been willing to share data about their programs (such as usage guidelines, number of cameras, and budgetary information), many others are reluctant and will refuse to make this information public outside of a formal request governed by the relevant state’s freedom of information laws.

## Key Findings by Area of Analysis

Findings and recommendations are presented for each methodological focus area (policy/legal, quasi-experimental/statistical, managerial, and technical). Please note that while we provide a summary of our recommendations here, all recommendations are presented in more detail in Chapter 4.

### **Key Findings of the Empirical and Quasi-Experimental Statistical Analysis of the Criminal Deterrence Goal of the Program (details available in Chapter 2)**

One of two primary goals of the CSC program is to deter violent crime. These findings review the effectiveness of the CSC program for deterring violent crimes and other types of crime.

*Effect of the CSC Program on Violent Crime.* We find no evidence of an impact of the Community Safety Cameras on violent crime. Violent incidents do not decline in areas near the cameras relative to areas further away, we observe no decline in violent crimes occurring in public places, and we observe no statistically significant differences in the relationships between the before-after change in crime and the distance from the camera locations for our locations receiving cameras and our comparison sites.

*Effect of the CSC Program on Homicides.* Analysis of specific violent crime rates reveals a decline in overall homicides in areas near the cameras but an increase in areas far from the cameras, suggestive of a displacement effect. However, disaggregating the data into homicides occurring in public as opposed to private areas yields little evidence of a decline in homicides near the cameras or a significant increase in homicides far from the cameras. Thus homicide patterns in the areas surrounding the cameras during the time period before, during, and after camera installation are consistent with random variation in this crime series.

*Effect of the CSC Program on Property Crime.* We find statistically significant and substantial declines in property crime within view of the Community Safety Cameras. Within 100 feet of camera locations, Part 1 felony incidents<sup>5</sup> decline by 24 percent. We do not see corresponding declines in the immediately adjacent areas or observe increases in property crime in these areas. When we analyze incidents occurring in public and incidents occurring in private places separately, we find statistically significant

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<sup>5</sup> According to the FBI's Uniform Crime Reporting classifications, Part 1 crimes are: Criminal Homicide, Forcible Rape, Robbery, Aggravated Assault, Burglary, Larceny-theft (except motor vehicle theft), Motor Vehicle Theft, and Arson.

and substantial declines (on the order of 30 percent) near the cameras for crimes occurring in public only, and no relationship between distance from the camera and the change in crime for property crime occurring in private locations. Finally, we do not observe corresponding relative changes in crime near the cameras for areas in our comparison sample. Thus, all three tests point to a significant deterrent effect of the cameras on property crime.

*Effect of the CSC Program on Part 1 Property Offenses.* Analysis of specific Part 1 property offenses reveals that the entire impact of the Community Safety Cameras on property crime rates is occurring through an impact on larceny theft. Included in this broad crime category are pickpocketing, purse snatching, theft from buildings, and thefts from automobiles (though not automobile theft).

*Effect of the CSC Program on Drug Offenses, Prostitution, and Vandalism.* We find no evidence of any effect of the cameras on drug incidents, or on prostitution, vandalism, and incidences described as suspicious occurrences.

*Effect of the CSC Program at Individual Camera Locations.* We include a limited set of site-by-site estimates of the deterrent effects of the cameras. We caution against reading too much into these estimates, as the degree of statistical uncertainty is fairly large. This lack of precision is driven by the much smaller sample of days used to tabulate average daily incidents before and after installation, when we estimate relative impacts on a location-by-location basis rather than pool all locations together. With this caveat in mind, we observe three locations with particularly significant declines in property crime near the cameras (26<sup>th</sup> and Treat Ave.; Haight and Webster; and the cluster of cameras at Jones and Ellis and Turk and Taylor). At the remaining locations, the estimates are too imprecise to rule out effects of the camera installations comparable in magnitude to those observed for the pooled sample of locations. A similar caveat applies with regard to violent crime. Nonetheless, we do observe two locations where there are statistically significant declines in average daily violent incidents in the area near the cameras but not in more distant areas (19<sup>th</sup> and Mission, and Mission and Geneva).

### **Key Findings of the Analysis of the Investigatory Goal and Secondary Goals (details available in Chapter 3)**

The second primary goal of the CSC system is to provide SFPD investigators with a forensic tool to investigate crime that occur within view of the cameras and to assist in the prosecution and defense of charged crimes. This section discusses the effectiveness of the CSC program in supporting that objective as well as the performance of the program in relation to the secondary objectives identified by the CITRIS team.

*Benefits of CSC for Criminal Investigations.* SFPD officers and others note that despite poor image quality, CSC footage has been useful for criminal investigations; while there are occasional instances where suspects or witnesses can be identified, more often footage is helpful in establishing a sequence of events for a crime or placing witnesses at a scene. As of August 2008 the SFPD had requested CSC footage 120 times, or approximately three requests per month over the past three years. Since the program began in 2005, CSC footage has assisted the SFPD in charging a suspect with a crime in six cases.<sup>6</sup> There has been limited success with the cameras acting as a “silent witness,” with footage standing in for witness testimony; some anecdotal evidence suggests that the existence of CSC program footage can actually deter witnesses from cooperating under the assumption that the cameras have caught all necessary evidence. Finally, according to a San Francisco public defender, CSC footage contributed to charges against suspects being dropped or amended by the DA’s office’s on at least two occasions.

*Issues with CSC for Investigations.* Poor image quality (in particular with images captured at night) and a low frames-per-second recording rate (leading to choppy video that can miss detail, such as a car passing through an intersection) are the top complaints investigators and others had about the CSC system. The generally poor quality often makes it impossible to identify suspects and witnesses, as well as crucial details such as license plates on vehicles. Furthermore, some complaints were voiced about the process for requesting footage (in time-sensitive investigations, investigators preferred viewing footage prior to requesting copies in order to see if any valuable data was captured by the cameras). While one attorney we spoke with in the DA’s office claimed that juries will not convict based on

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<sup>6</sup> Id.

camera footage alone, regardless of how good it is, as noted there is some anecdotal evidence that the existence of the CSC system may actually contribute to additional noncooperation as witnesses become less willing to risk retaliation due to their perception of the power of the alternative evidence provided by the cameras. While no specific evidence was offered to support this, some system users believe the camera footage may encourage witnesses to step forward because it can support their recollection of events, and perhaps encourage their belief that a conviction will result from their testimony, thereby reducing concerns about possible retaliation. More data about how the CSC program affects the actions of witnesses and other participants is necessary to fully understand how it integrates into the investigatory and prosecutorial processes.

*Prosecution and Defense Investigatory Issues.* In interviews, both prosecutors and defense attorneys reported that they were not consulted during the initial design of the CSC program. Defense counsel was particularly concerned with the lack of a special process through which they could access CSC program footage from the Department of Emergency Management. Amendments to the CSC Ordinance in 2008 responded to defense counsel concerns by adding a specific provision for defense counsel access and increasing the retention period of CSC program footage. But the amendments also raise questions about how CSC program footage relates to standard discovery processes and state and federal law with respect to the rights of the accused and the obligations of the prosecution. Defense counsel, the current director of the Mayor's Office of Criminal Justice (MOCJ) and the DA's office voiced some concerns with this set of issues during our interviews. The Ordinance now provides rules to govern access to footage by both the prosecution team (the investigators) and defense counsel. However, the unusual administrative structure and the Ordinance provisions governing access to the CSC program footage, as well as the increase in requests for CSC program footage under the amended access provisions, are increasing demands on the system and may have a significant impact on the system going forward as the issues are worked out by the parties involved. Clarifying the relationship between the CSC program and existing legal obligations and procedures and documenting the needs of stakeholders would facilitate better planning and resource allocation to support foreseeable program uses. It may also provide a basis for revising the access provisions under the Ordinance to meet access and oversight objectives while minimizing the burdens associated with both.

## Key Findings Affecting the Secondary Objectives of the CSC System

As we noted earlier, our sources of analysis reveal several second-order objectives that both inform and constrain the City in its pursuit of the primary objectives. These secondary objectives are reflected in both procedural and substantive limitations placed on the growth and use of the CSC program. Among them:

- Community Participation—including public discussion about the expansion of CSC program, notice to individuals in areas under surveillance, a test that requires the consideration of the affected community’s concerns, and a requirement that significant support from the affected community exists for a proposed camera installation.
- Accountability and Oversight—including constraining the CSC program to the investigation, prosecution, and defense of specific crimes, processes that facilitate auditing, and annual reporting on the program’s use and effectiveness.
- Protection of Privacy, Freedom of Expression, and Related Rights—including limiting the areas under surveillance, foregoing real-time monitoring of cameras, and turning cameras off during demonstrations.

We now discuss each point in detail.

*Community Participation.* There is evidence that the public notice and hearing process have effectively engaged the community in a dialogue about the CSC system. Compared to other cities that have adopted surveillance cameras as part of a policing strategy, San Francisco has been far more transparent about its aims, processes, and conclusions.<sup>7</sup> The Ordinance itself is one among very few that govern surveillance cameras across the country. It is the only measure requiring that the affected community’s concerns be considered in making decisions about whether to install cameras in specific places. The City is one of the first municipalities to conduct an outside evaluation of its video surveillance system for distribution

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<sup>7</sup> Many of the nonprofit organizations and scholars that have raised concerns about the proliferation of video surveillance cameras across the country have been specifically disturbed by the lack of public input on and regulation of the programs. See “Under the Watchful Eye: The Proliferation of Video Surveillance Systems in California,” Mark Schlosberg and Nicole A. Ozer (discussing lack of enforceable regulations and lack of policies guiding such systems in California, with the exception of San Francisco as of June 2006), The California ACLU Affiliates, Aug. 2007. Available at: [http://www.aclunc.org/issues/government\\_surveillance/asset\\_upload\\_file140\\_7730.pdf](http://www.aclunc.org/issues/government_surveillance/asset_upload_file140_7730.pdf). See also *Guidelines for Public Video Surveillance: A Guide to Protecting Communities and Preserving Civil Liberties* (recommending public oversight and accountability through “a detailed, participatory and transparent process” in which “members of the community that would be affected by a proposed system should have the opportunity to participate in the decision to create such a system, as well as the subsequent major decisions affecting its coverage and capabilities”) pp. 20–21, The Constitution Project, 2006. Available at: [www.constitutionproject.org/pdf/Video\\_Surveillance\\_Guidelines\\_Report\\_w\\_Model\\_Legislation4.pdf](http://www.constitutionproject.org/pdf/Video_Surveillance_Guidelines_Report_w_Model_Legislation4.pdf).

to the public and for use in making decisions about the future of the program. The quantity and quality of information provided to the public about the CSC program through this report is unparalleled.

*Accountability and Oversight.* The Ordinance constrains the CSC program to the criminal context, limits police use of CSC program footage to investigations of specific crimes, and builds in processes to facilitate auditing. The policies and structures of the CSC program limit potential misuse of the cameras and footage, but also limit the SFPD's ability to determine for itself how to best use the CSC program cameras and resulting footage in its efforts to reduce crime. Interviews with investigators and Department of Emergency Management (DEM) staff reveal that CSC program footage sometimes is viewed prior to being formally requested, and at times written requests are not subsequently filed with DEM. Investigators view footage before deciding whether to request copies of CSC program footage to reduce workload demands on DEM and the SFPD supervisors and to more quickly assess the footage's potential evidentiary value. This approach to previewing footage does not result in the detailed records generated under the standard and exigent processes for investigator access to CSC program footage, as called for by the Ordinance. The lack of comparable records documenting the purpose of access to CSC program footage limits the ability to audit and analyze system use.

*Protection of Privacy, Freedom of Expression, and Related Rights.* San Francisco has adopted a strong framework to govern the installation and use of the CSC system in a manner that respects the City's commitment to protecting privacy and associated rights. The Ordinance limits what the CSC program cameras can record to "areas perceptible to the human eye from public streets and sidewalks," and where the camera view incidentally will capture private areas, such as residences, the City employs digital masking to block recording of those areas. In 2007, the San Francisco Police Commission conditioned CSC program expansion on responding to formal requests to turn off cameras during political demonstrations. The Ordinance also limits who may receive access to CSC program footage, the purposes for which access may be provided, and subsequent disclosures of footage. Furthermore, the public hearings required by the Ordinance when new CSC program camera installations are proposed provide all interested parties an opportunity to consider privacy and other concerns. And the Ordinance requires that concerns of the "affected community," including privacy concerns, be weighed against the potential deterrent effect in the Police Commission's assessment of whether or not to approve a proposed CSC program camera installation.



The CSC program provides a rich set of protections and restrictions on system use and footage access designed to protect privacy and related interests. However, additional training and guidance on specific issues—such as how much footage to request during an investigation and how to use the footage-viewer software—would facilitate the achievement of these secondary objectives. Translating policies into systems and practices that can support them is an important part of implementing these secondary objectives. Developing policies and practices depends upon a management team that attends to the needs of the system users, including their need to comply with Ordinance requirements and otherwise facilitate the ability to meet the range of secondary objectives.

#### **Key Findings of the Performance and Management Analysis (details available in Chapter 4)**

In this section we present the key findings of our analysis of the performance and management of the CSC system. According to a 2005 U.K. Home Office evaluation of thirteen closed circuit television (CCTV) programs, “three key team characteristics determined whether the CCTV systems were designed to meet their objectives: access to appropriate technical expertise, full engagement of end-users, [and the] suitability of [the] project manager.”<sup>8</sup> This finding echoes similar comprehensive studies of CCTV systems, identifying managerial aspects as crucial components in determining why some CCTV systems appear to succeed in their objectives and others fail.

*Pilot Status of Program.* The CSC program was expanded from a pilot project of two cameras to a far more complex system of seventy-one cameras as of April 2008, without formal recognition that the program had grown into a full-scale technology project.<sup>9</sup> This growth, combined with the failure to allocate the resources and attention the program’s size requires, is a key problem in CSC program management. Official acknowledgement must be made by MOCJ and the Police Commission that this program is no longer a pilot; accordingly we suggest implementing the recommendations made in this report, in particular instituting a project manager role and formal review of the existing technical

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<sup>8</sup> Gill, Martin and Spriggs, Angela. “Home Office Research Study 292: Assessing the Impact of CCTV.” United Kingdom Home Office Research, Development and Statistics Directorate, February 2005. Accessed September 4, 2008 at <http://www.homeoffice.gov.uk/rds/cctv2.html>.

<sup>9</sup> The Police Commission still considers the CSC project to be a pilot pending the conclusion of this report.

infrastructure and user requirements as discovered by CITRIS<sup>10</sup> during this evaluation. We do not recommend continuation or expansion of the CSC program unless these issues are addressed.

*Lack of Project Manager, End-User Requirements, and Feedback.* The most significant management oversight in the CSC program is the lack of a project manager. The Ordinance does not explicitly place a specific department or individual in charge of the CSC program, though the Mayor's Office of Criminal Justice functionally directs the program. However, due to high turnover at MOCJ, a lack of consistent management has limited the efficacy of the CSC project. Because most of the system's users have little or no understanding of its technical aspects, without a clear position of oversight and contact the technical issues that hamper system usage or efficiency go unreported and unsolved. The lack of a dedicated project manager and appropriate planning has also meant that during the project development phase and afterward there were no attempts to gather and document user requirements. Finally, a program of this scope and size requires a dedicated manager to ensure successful implementation.

#### **Key Findings of the Hardware and Network Analysis (details available in Chapter 4)**

This section presents the key findings of our technical assessment of the CSC system. This assessment provides the basis for recommendations to improve image quality and other technical issues for the existing system.

*System Architecture and Hardware.* CITRIS identified several system architecture and hardware issues that, if addressed, would improve the quality of the existing system. Many of these issues were already known to the City's Department of Technology and Information Systems [DTIS], but have not been addressed for budgetary reasons. DTIS never received specific user requirements, such as mandating that recorded images capture a sufficient level of detail at specific recording distances to identify individual humans or details such as license plates, which have affected recording quality. Requirements such as these would have allowed DTIS to calibrate recording quality and distance in accordance with existing storage space and budget and allowed DTIS to advise MOCJ and the Police Commission concerning potential trade-offs between quality and optimal camera numbers. In addition, to the best of

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<sup>10</sup> Due to the scope of this study, we can outline only the most pressing issues our research uncovered, and were unable to probe all user, business, and technology requirements in depth. Additional inquiry is needed to fully capture such requirements.

our knowledge MOCJ has not had staff with in-depth technology expertise. It appears likely that MOCJ staff, who were responsible for day-to-day management of the CSC system, were unaware of the technical complexities involved with managing the CSC program, particularly as it grew beyond its small pilot status into a major undertaking. This lack of understanding led to additional issues with the efficacy of technology usage in this program.

*Lack of Data Analytics and Technology Infrastructure at SFPD.* The SFPD's technology infrastructure is out of date. SFPD only recently created a Chief Information Officer (CIO) role; prior to that, officers with limited or no technology experience were rotated through a technology command position every three years. While the creation of a permanent civilian CIO position is a positive development, the department still faces significant obstacles. A detailed analysis of the SFPD's technology infrastructure is outside the scope of this report, but the CITRIS team did interview the SFPD's former CIO to ascertain the general state of technological support and resources in the context of either maintaining or expanding the CSC program. From that interview we confirmed that the department's information infrastructure was nearly twenty years out of date and that SFPD faces the significant task of tackling basic technology infrastructure problems. With these limitations, it does not appear possible for SFPD to integrate any of the technological aspects of the CSC program within its operations. This presents a substantial challenge when considering future changes or expansions to the CSC program, given that tightly integrating the program in the Department's policing strategies and goals would provide key benefits.

*Department of Emergency Management [DEM] End-User and Technical Issues.* It does not appear that any formal requirements were gathered to assess the needs of or impact on DEM staff members, who manage CSC records and requests, during the CSC program's development. While the existing process for requesting CSC footage is time consuming, it appears workable with the current level of requests. However, it does not appear to be scalable if the program continues to grow. Since the pilot began in 2005, the number of requests has increased steadily each year, and the 2008 Ordinance changes that allow the defense counsel to request footage are increasing the number of requests by approximately 50 percent, according to DEM. If the City adds additional cameras, it would be inadvisable to do so without assessing the impact on DEM staff, and at minimum purchasing additional equipment to allow multiple requests to be processed simultaneously. Substantial improvements or changes to the CSC program

require a complete restructuring of the system's end-user component, including a specific requirements-gathering phase to ensure users' needs are met.

*Lack of Documentation and Training for SFPD and Others.* The CITRIS team found that training and documentation on how to view video footage burned to DVD discs was not provided to SFPD officers, the DA's office, or the Public Defender's Office. SFPD officers initially were issued a bulletin informing them of the installation of the first set of cameras in 2005<sup>11</sup>, and an updated bulletin was issued in 2007<sup>12</sup> with a comprehensive list of camera locations current as of August 6, 2007. Both bulletins briefly describe the procedures for obtaining footage, but discuss no guidelines for use or give any specific instructions for viewing footage or any other relevant training. We are unaware if either the DA's office's office or public defenders' offices issued any formal notices to their respective staffs.

## **Summary of Primary Recommendations (all recommendations available in Chapter 5)**

Depending on San Francisco's priorities and finances, there are other technological approaches to consider that would either enhance the passive framework the City has used to date or would introduce an actively monitored system. Either change in approach will require reevaluating the CSC program's goals to ascertain whether the new approach will continue to support the goals of providing forensic evidence to investigators and deterring crime<sup>13</sup>. In the final chapter of this report we give general recommendations for both strategic approaches. However, we must note, as we do throughout this report, that based on existing research there is no guarantee these recommendations will succeed, due to video surveillance's inherent limitations as a crime-fighting tool and to the system's dependence on multiple contextual factors that can contribute to its success or failure. As such, if the City chooses to take a different approach, we would advise that it does so cautiously, through an evidence-based process that allows for clear measurement and assessment of the system's goals and results.

## **Improvements to the Existing CSC System**

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<sup>11</sup> SFPD Bulletin 05-164

<sup>12</sup> SFPD Bulletin 07-174

<sup>13</sup> As noted earlier, most existing evaluations provide mixed or no support for the use of video surveillance to specifically target violent crime. Any change in technology will necessitate a discussion about the City's crime deterrence goals and an evaluation of how the change may or may not support those goals.

The recommendations we give to improve the current CSC program rest on several assumptions. First, that the City sees value in a forensic investigatory tool for the SFPD and other departments. Second, that the City finds there is value in the deterring the type of property crimes, as opposed to violent crimes, our research found the CSC system effects. And third, if the City remains committed to the existing CSC strategic model, then this report should identify the critical issues that, if addressed, would facilitate improvements to that model. To that end, our recommendations provide guidance on improving the CSC system's functioning as a tool for deterring property crime or supporting investigation and prosecution, or both. In sum, if the technical and policy recommendations we make are followed, we would expect the CSC image quality to improve and be on par with the quality other cities are experiencing. If the management issues already discussed are addressed, within whatever strategic model the City wishes to follow the program should be better optimized to meet its goals and reflect the expressed needs of its users. Should the City wish to change the design and goals of the program, we would argue that these management recommendations and the need to collect user requirements would still be required; they reflect deficiencies that must be addressed in the successful administration of any technical project, and to resolve issues specific to video data capture.

*Use of CSC Footage as an Investigatory Tool.* We recommend providing a more structured process for SFPD investigators to access specific footage to determine its utility prior to formally requesting a copy; identify strategies for expanding community understanding about the strengths and limits of the CSC system in order to support a more informed discussion of the CSC program; and, with regard to the use of footage as a forensic tool, ensure the CSC program is compliant where practicably possible with the guidelines and best practices set forth by the Law Enforcement and Emergency Services Video Association (LEVA),<sup>14</sup> as well as solicit feedback specifically from the SFPD forensic video investigator regarding any changes to the system including changes made as a result of this report.

The process for accessing CSC program footage should be reformed to provide accountability for all its use, particularly to create a separate process for investigators to view specific footage on site at DEM prior to formally requesting footage under the Ordinance. Such access would reduce the DEM/SFPD workload associated with identifying relevant evidence in CSC program footage. Audit logs of

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<sup>14</sup> LEVA guidelines and best practices for acquisition of digital multimedia evidence and forensic analysis are available at [www.leva.org](http://www.leva.org).

such access should be maintained and include the identity of the requestor, the specific crime under investigation, the footage reviewed, and whether or not a copy was later requested.

*Prosecution and Defense Investigatory Issues.* We recommend that the relationship between CSC program administration and procedures and existing legal obligations and procedures be further clarified to facilitate planning and resource allocation to support foreseeable program uses. We also recommend that DEM be allocated additional storage capacity to support the thirty-day footage-retention period, or that alternatives to a blanket thirty-day retention rule be considered and the Ordinance further amended. It is possible that the purpose of the revised Ordinance—to provide defense counsel time to assess whether CSC footage should be requested—for which the camera footage retention period was extended could be achieved through other mechanisms that would place fewer demands on program resources. For example, an automated process for retaining CSC camera footage relevant to every crime report for an extended period of time could be established. This would allow the bulk of CSC camera footage to be purged within a shorter period of time, while ensuring that footage relevant to crimes is maintained and available to investigators and defense counsel.

*CSC Program Management Recommendations.* A primary owner must be established for the CSC program. In our assessment, to date, MOCJ has provided insufficient oversight, coordination and management. As noted earlier, turnover within MOCJ has contributed to the lack of consistent management. From a functional standpoint, we would recommend that the program be managed by SFPD; however, as discussed in Chapter 4 there is no infrastructure or personnel within the SFPD to handle the complexities of this system. Therefore, placing the CSC program within SFPD would require investing in technical and administrative systems to support it. Placing the CSC program within the SFPD would likely yield a greater degree of integration into other policing strategies and practices, with potential benefits, than keeping it within the primary purview of MOCJ. However, placing it within SFPD could have ramifications for defense counsel access and other policy issues. Regardless of where it is placed, we recommend appointing a project manager whose experience includes coordinating efforts among multiple stakeholders. Ideally, this person would have some experience and familiarity with technical systems. The project manager should be the single point of contact for all CSC program-related issues. All CSC program users should be made aware of the project manager's role and responsibilities and contact information. If the CSC project manager does not have technical experience,

the entity in charge must identify a corresponding technical lead (likely at DTIS) who can act as a single point of contact for the CSC project manager on all technical issues with the CSC system. We recommend convening stakeholders to retool the mechanisms for dealing with public defender access and witness protection issues in the CSC system. The current incomplete approach raises a host of problems and questions about how the system relates to the normal criminal justice processes.

*Technical Recommendations for CSC Infrastructure.* Increasing storage capacity at DEM would increase the frame rate of stored CSC program footage, thereby improving its quality while also enabling DEM to store footage for the thirty-day period required under the Ordinance.<sup>15</sup> It might also improve efficiency for downloading footage. DTIS estimates the cost of this recommendation may exceed \$3MM. In addition, should the City wish to expand the CSC program, a realistic and detailed assessment is essential to determine the potential impact on SFPD technology infrastructure, to examine how an expanded CSC program would fit with the SFPD's strategic technology goals; and to study whether the SFPD's existing data analytics capabilities would work with any such expansion. This assessment should include analysis of the type of crime and incident data that would be beneficial to share with a camera system to inform strategic deployment, as well as the type of data a camera system could provide to a centralized crime data repository to better inform data analysis.

*Technical End-User Recommendations.* In addition to identifying the process and feature needs of users such as the DA's office, public defenders, and SFPD investigators, the City must also investigate the needs of the system's technical users. This includes an increase in the efficiency and reliability of the download and DVD burn process for DEM staff, as well as in-depth evaluation—with DEM staff participation—of existing processes and requirements.

*Policies, Procedures, Training, and Documentation Recommendations* One considerable deficiency with the existing program is the general lack of written policies and procedures, training materials, and general documentation across the board. MOCJ or an appropriate entity should develop policies, practices, and training materials to assist in implementing the Ordinance and optimizing use of CSC system resources. Policy and practices guidelines are needed on how to use the system generally and in a manner consistent with the Ordinance. The CSC project manager should create documentation and

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<sup>15</sup> Interview with DTIS staff.

training materials for all CSC users on how to access CSC footage using the proprietary software viewer.

## **Considering Other Technological Approaches**

Depending on San Francisco's priorities and finances, there are other technological approaches to consider that would either enhance the passive framework the City has used to date or would introduce an actively monitored system. Either change in approach will require reevaluating the program's goals to ascertain if the approach continues to support the goals of providing forensic evidence to investigators and to deter crime<sup>16</sup>. However, even with our recommendations in place, CSC program leaders must be clear-eyed about the limitations to the current strategic approach and candid with City residents about those limitations, as community members often request installation of surveillance cameras without understanding their inherent limitations as well as, in this case, the fact that the Community Safety Cameras are not actively monitored by SFPD. For example, adding additional cameras to existing sites, or to additional locations around the City, may increase the investigatory power of the program but does not address the issue of deterring violent crime. As we have explained at several points in this report, research to date concludes that public video surveillance generally is not effective or only somewhat effective in deterring violent crime; any success at combating violent crime may entirely depend on a specific deployment context (to be discussed later in this section) and not on the mere presence of cameras.

*Enhancing the Existing Passive System.* San Francisco leaders could consider adding technological measures to the system to specify and target specific criminal behavior. Examples include integrating the City's investment in ShotSpotter gunshot detectors with the camera network, or adding automatic threat-detection software. The City could also consider deploying a model of limited active monitoring driven by the technologies mentioned here as well as by emergency calls for service and officer reports from the field in order to respond quickly to emergencies. All of these suggestions have limitations, which are discussed in detail in Chapter 4.

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<sup>16</sup> As noted throughout this study, most existing evaluations provide mixed or no support for the use of video surveillance to specifically target violent crime. Any change in technology will necessitate a discussion about the City's crime deterrence goals and an evaluation as to how the change may or may not support those goals.



*Active Approach—Real-Time Monitored Video Surveillance.* Nearly every subject we interviewed for this study mentioned live monitoring of video surveillance cameras in some context; typically, interviewees assumed that if the SFPD monitored the cameras the CSC system would be far more effective. Generally, assumptions that live monitoring will dramatically improve the CSC program are not based on concrete evidence.<sup>17</sup> The vast majority of evaluation research, conducted on monitored systems, offers evidence that monitoring surveillance cameras will not guarantee effectiveness in deterring crime. We discuss the benefits and limitations of monitoring—and the related resource allocations it requires—and make an extremely specific and qualified recommendation for the City to consider should it wish to pursue a live monitored system. In sum, should the City wish to experiment with an actively monitored system, we recommend it use a highly targeted model that focuses installing a significantly greater number of cameras in one to two discrete areas (as opposed to the existing strategy of installing only two to four cameras at many locations throughout the City), chosen on the basis of set criteria such as crime types and rates and the physical characteristics of the area. This model would coordinate the strategy and response tightly with SFPD and the local community. Furthermore, it requires a long-term commitment to both the project (including increased resources for SFPD and other City units in order to respond to increased calls for service and related issues in the targeted areas) as well as for evaluating the effectiveness of the effort. This suggestion is based primarily on the results of the Los Angeles Police Department’s efforts with video surveillance in that city’s MacArthur Park and Jordan Downs areas. However, no matter what approach San Francisco decides to take, we highly recommend it conduct careful and critical research, reviewing both existing evaluations as well as conducting site visits to other municipalities, before adopting any technological changes to the current CSC program. Furthermore, we recommend that for any changes the City implements it do so with a clear evaluation strategy in place to ensure that the program’s effectiveness can be measured optimally over time.

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<sup>17</sup> “Major academic books on CCTV have shown the ambivalence of its employment. While mostly advocates and critics believe that visual surveillance technology works, these studies explain that CCTV has to be seen in broader social and political contexts and that every optimistic belief in the effectiveness of technology is pure fantasy.” Hempel, Leon and Topfer, Eric. *Urbaneye: CCTV in Europe. Final Report*. August 2004, pg. 17. Available at [http://www.urbaneye.net/results/ue\\_wp15.pdf](http://www.urbaneye.net/results/ue_wp15.pdf).

## Introduction



**Figure 1-1: A Community Safety Camera and Notice in the Western Addition**

*“One cannot make any generalizations about the extent, nature and impact of CCTV surveillance from the mere existence of a system. CCTV systems are deployed for various purposes, have diverse levels of technological sophistication, operating procedures and staffing policies. Operation and impacts have to be understood as the outcome of the interplay between technological, organizational and cultural factors.”<sup>18</sup>*

—*CCTV in Europe*, UrbanEye Project, 2004

Cameras are the most visible part of a video surveillance system, yet they reveal relatively little about it. Whether a surveillance system is comprised of a single camera and a VCR in a convenience store, or the complex crime fighting apparatuses in place today in the cities of Los Angeles and Chicago, it is

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<sup>18</sup> Hempel, Leon and Töpfer, Eric. *CCTV in Europe: Final Report*. Presented at “On the Threshold to Urban Panopticon? Analysing the Employment of CCTV in European Cities and Assessing its Social and Political Impacts,” August 2004. Available at [www.urbaneye.net](http://www.urbaneye.net).

comprised of technical components as well as the individuals who use it and are subject to it. While the technical aspects of the system are important—specifically, the need for system technicians, managers, and to some degree, users to understand its capabilities and limitations—the “sociotechnical” elements are also crucial. A city can purchase a state-of-the-art, comprehensive video surveillance solution, but if its managers and users lack any understanding of how to use the system, or fail to integrate it into a department’s existing processes and culture, for example, it can also be no more than a significant waste of money. Similarly, if a city implements a surveillance system expecting the watched population to respond in a specific way and in fact it responds in an unanticipated way, the system may not produce the desired result.

Video surveillance system evaluations in Europe, most notably the UrbanEye Project in 2004, which evaluated a range of systems in seven countries, and the comprehensive Home Office evaluation of thirteen projects in the United Kingdom in 2005, in an effort to understand the contexts and mechanisms that cause video surveillance projects to succeed or fail, identified a range of factors that required consideration in any system evaluation. The Home Office report notes that “The characteristics of a system that determine whether it is likely to have a chance of success”<sup>19</sup> include:

- System objectives
- Management of the project
- Technical characteristics of the video surveillance system

Our evaluation considers each of these aspects. It first sets out a high-level overview of the CSC program. It then reviews the City’s objectives in establishing the program, considers the policy and procedures that govern its use, documents the technical characteristics of the system, examines the administrative structure and management of the function, and considers how the CSC program is used and managed on a day-to-day basis by the City. Through this holistic evaluation, the CITRIS team has documented its findings and developed guidance and recommendations to improve the existing CSC program’s ability to meet current objectives.

## **Structure of the CSC Program**

The structure of the San Francisco CSC program is unique. In other cities surveillance cameras are

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<sup>19</sup> Gill, Martin and Spriggs, Angela. Home Office Research Study 292: Assessing the Impact of CCTV. United Kingdom Home Office Research, Development and Statistics Directorate, February 2005. Accessed September 4, 2008 at: <http://www.homeoffice.gov.uk/rds/cctv2.html>

typically run and managed by the police department and designed to support specific policing objectives, such as crime deterrence or resource redirection. Subject to state or local laws, law enforcement staff in San Francisco and elsewhere may have access to footage recorded by other public<sup>20</sup> and private camera systems, but such systems typically are not operated by the police or integrated into policing.<sup>21</sup>

In contrast, San Francisco's CSC program is not run and managed by the San Francisco Police Department (SFPD). The CSC program was initiated by the Mayor's Office of Criminal Justice (MOCJ), and built by the Department of Telecommunications and Information Services (DTIS), which has the sole ability to position and orient the cameras and also maintains the servers and networks that support the system. The CSC footage is placed in the custody of the Department of Emergency Management (DEM). The placement of cameras is ultimately in the control of the San Francisco Police Commission, subject to procedural requirements set out in the 2008 Ordinance. The director of the MOCJ may recommend the installation of additional cameras to the Police Commission, which must then seek community input and engage in fact finding and analysis prior to approving or denying an installation.

Once CSC program cameras are installed, there is little interaction, beyond the retrieval of footage by investigators, between the SFPD and the CSC program. The CSC program is not a resource that the SFPD actively deploys within its crime-fighting strategy. There also appears to be no clear policy or practice by which the police can request that the cameras be repositioned. While the SFPD, in particular the Gang Task Force, gave input on the initial placement of the cameras, we found no evidence of regular or routine communication between DTIS and the SFPD about camera installations and positioning. The police officers we interviewed typically had no idea how to request that cameras be repositioned or how to report problems with the cameras; those that did had learned through informal means. The limited number of SFPD memos to officers about the CSC program did not advise them who to contact with problems or questions. We explore these issues in more depth in Chapter 4.

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<sup>20</sup> Other city-run camera systems may exist, such as in schools, on public transit, and, in many cities, critical infrastructure systems funded by Department of Homeland Security anti-terrorism funds. These systems are typically used to protect buildings, utility plants, monuments, and other infrastructure deemed to be of interest to terrorists. While these systems might be actively monitored, they are done so with the specific goal of protecting the physical structure and not to proactively search for general criminal behavior.

<sup>21</sup> One exception to this rule is the city of Baltimore, where as of 2007 a municipal system owned and managed by the City operated with specific public safety goals; system operators have a direct connection to the Baltimore Police Department, and report criminal or other suspicious activity. Baltimore also has an additional camera system that is operated by the BPD that focuses on criminal activity.

The CSC program footage are controlled by DEM, which like DTIS is a separate department from the SFPD. As a practical matter, neither the cameras nor the footage they generate are directly under the physical control of the SFPD. Under the Ordinance, the SFPD obtains copies of CSC system footage by presenting to the DEM a written request from an inspector or higher-level official and approved by a captain or the deputy chief of inspectors.<sup>22</sup> In exigent circumstances, DEM may release information to an inspector prior to receiving a written request; however, an inspector must then file a written request documenting the exigent circumstances, and within seven days of the footage's release the inspector must provide DEM with the written approval of the supervisor and captain of the inspector's initial written request.<sup>23</sup> Defense attorneys and court-appointed investigators assisting *pro se* criminal defendants (hereinafter defense counsel) may request, in writing, camera footage in connection with a charged criminal case.<sup>24</sup> The defense counsel must concurrently deliver a copy of the request for footage to the DA's office.<sup>25</sup> DEM provides the footage to the DA's office, who may review the footage with members of the SFPD at the rank of inspector or higher and has five days from receipt of the footage to determine whether to seek a court order preventing release of the footage to defense counsel.<sup>26</sup> Other disclosures of CSC program footage by DEM may only be made pursuant to a court order.<sup>27</sup> We explore the access and use of the CSC program footage in depth in Chapter 3.

The structure for the CSC program is novel and provides challenges with integrating it into the SFPD's policing strategies, as well as opportunities to structure system use and access through the Ordinance to facilitate oversight and accountability with respect to system use.

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<sup>22</sup> 19 S.F., CAL., ADMIN. CODE § 6 (2008).

<sup>23</sup> 19 S.F., CAL., ADMIN. CODE § 6 (C)(1) (2008). As we discuss in Chapter Three, inspectors report going directly to the DEM to review footage for relevance prior to requesting official copies. Footage may only be released to agencies other than the SFPD pursuant to a court order.

<sup>24</sup> 19 S.F., CAL., ADMIN. CODE § 6 (C)(2) (2008).

<sup>25</sup> 19 S.F., CAL., ADMIN. CODE § 6 (C)(2) (2008).

<sup>26</sup> 19 S.F., CAL., ADMIN. CODE § 6 (C)(2) (2008).

<sup>27</sup> 19 S.F., CAL., ADMIN. CODE § 6 (D) (2008).

## **Chapter 1: The San Francisco Community Safety Camera Program: Objectives, Technology, Policies, and Practices**

This chapter documents the primary objectives motivating the deployment of the CSC program and the salient secondary objectives that together shaped the program’s technical design, policies, and practices. Subsequent chapters consider whether the CSC program is effective at meeting the primary objectives of deterring crime, particularly violent crime and providing evidence of criminal activity to assist in the investigation and prosecution process, and considers whether it effectively supports the City’s secondary objectives—facilitating community participation, accountability and oversight, and protecting privacy and related interests. The central aim of this study is to analyze whether the current system is effective, however within our study and this report wherever possible we shed light on *why or why not* the CSC program was effective at meeting the City’s various objectives. We believe this information, in combination, provides a stronger basis upon which the City can formulate strategies and expectations around the CSC program and other camera systems it currently operates or may consider in the future.

### **Establishing the Objectives of the CSC Program**

*“The role of the safety camera in San Francisco, we believe, is clearly designed to enhance public security by deterring crime.”*

—Allen Nance, Former Interim Director of the Mayor’s Office of Criminal Justice<sup>28</sup>

Identifying the City’s goals for the CSC program is vital to this evaluation. There is no single statement of purpose that articulates the City’s objectives for the CSC program. To the best of our knowledge there is no formal program documentation or other foundational document outlining the program’s goals. To clarify the City’s objectives, we analyzed primary and secondary documents (contemporaneous with the system’s creation, expansion, and modification) and conducted multiple interviews with stakeholders and participants in the debate, creation, use, and management of the program. Sources include:

- Text of the Municipal Ordinances governing the CSC program
- Documents and data provided by City agencies about the camera systems specifications, management, policies, and procedures

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<sup>28</sup> Speaking at a City of San Francisco Police Commission public hearing, November 15, 2006.

- Interviews with over thirty program stakeholders and end-users
- Documents published to the SFGov.org website
- Minutes and video recordings of public hearings
- Press releases and news articles
- Site visits conducted with the cities of Los Angeles and Chicago for comparative insights, in addition to previous site visits conducted by CITRIS researchers

A review of these sources reveals two primary goals: deterrence of crime, with an emphasis on violent crime; and support for the investigation, prosecution and defense of specific charged crimes. These sources reveal several second-order<sup>29</sup> objectives that both inform and constrain the City in its pursuit of the primary objectives. These secondary objectives include fostering community participation in decisions about the CSC program, facilitating public oversight and accountability of program use and program effectiveness, and minimizing intrusions on personal privacy and related interests. This rich set of objectives influenced the design and implementation of the CSC program. The secondary objectives, while not inconsistent with the program's primary objectives, significantly shaped the CSC program. at times complicating the pursuit of core objectives. The objectives identified in the following section provide the foundation for the analysis of effectiveness contained in Chapters 2 through 4.

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<sup>29</sup> Secondary in this context does not convey any absolute sense of the rank importance of the values or objectives. It is meant to reflect the fact that the CSC system was not instituted as a means of advancing these secondary objectives, but had to attend to them while pursuing its primary missions of deterring and investigating crime.

## City surveillance cameras in San Francisco

At each of the existing locations shown below, there are anywhere from one to five surveillance cameras. Proposed locations are labeled.



Source: San Francisco Mayor's Office of Criminal Justice

The Chronicle

Map of San Francisco Community Safety Cameras as of October 2007.<sup>30</sup> There are two or more cameras at each site.

<sup>30</sup> Bulwa, Demian. "Newsom wants to add 25 cameras; Police Commission waits for crime data." *San Francisco Chronicle*, October 5, 2007. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/10/05/MNR7SK0VL.DTL&hw=san+francisco+crime+cameras&sn=004&sc=665>.



## **Primary Objectives**

The CSC Ordinance provides a starting point for assessing the City's primary and secondary programmatic goals.<sup>31</sup> The initial Ordinance was passed on June 6, 2006.<sup>32</sup> The Ordinance provides a legal structure for the CSC program designed "to regulate the installation of community safety cameras, prescribe a notification and approval process for the installation of cameras, and to establish protocols for oversight and access to video recordings."<sup>33</sup> It further defines the CSC program cameras as "any digital recording surveillance system" installed at "fixed locations" in an "open and obvious manner" by San Francisco to "film public streets, sidewalks or common areas of public housing complexes," and limits the purpose of installation to the "enhancement of public security only in locations experiencing substantial crime."

## **Deterring Crime**

The Ordinance directs the use of the CSC program to areas experiencing "substantial crime," as determined by the Police Commission based on crime statistics to be provided by the SFPD prior to a public hearing on every proposed camera installation. It is important to emphasize that in order to approve a camera installation, the Ordinance requires the Police Commission to find, after a public hearing, that "the potential to deter criminal activity outweighs any concerns asserted by the affected community." While the existence of substantial criminal activity is a threshold to camera installation, the potential to deter that activity must be found to outweigh "any concerns asserted by the affected community" before the Police Commission can approve any cameras for the CSC program.

The focus on deterring crime is reflected in the annual report the SFPD is required to provide, under the Ordinance, to the Board of Supervisors and the Police Commission. The annual report must identify the "camera locations, the crime statistics for the vicinity surrounding each camera both before and after the camera is installed, crime statistics from surrounding vicinities, the number of times the SFPD

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<sup>31</sup> While the first two Community Safety Cameras were installed on a pilot basis by the MOCJ outside a Western Addition public housing development near the corner of Eddy and Buchanan Streets a year before the initial Ordinance was adopted, the debates that occurred during that trial period are reflected in the Ordinance. San Francisco Mayor's Office Press Release, "Mayor Newsom and Community Leaders Unveil *Citysafe*," August 5, 2005. Available at [http://www.sfgov.org/site/mayor\\_page.asp?id=33731](http://www.sfgov.org/site/mayor_page.asp?id=33731); see also Rachel Gordon, "Cameras to fight crime: Round-the-clock surveillance outside housing project," *San Francisco Chronicle*, July 30, 2005. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2005/07/30/BAG7HE07481.DTL&hw=camera+program&sn=025&sc=472>.

<sup>32</sup> City of San Francisco Ordinance 127-06, amending the San Francisco Administrative Code to create Chapter 19, §§ 1-8. Available at <http://www.sfgov.org/site/uploadedfiles/bdsupvrs/ordinances06/o0127-06.pdf>.

<sup>33</sup> 19 S.F., CAL., ADMIN. CODE § 1 (2006). Available at <http://www.municode.com/content/4201/14131/HTML/ch019.html>.

requested copies of the recorded images, the number of times the images were used to bring criminal charges, the types of charges brought, and the results of the charges.”<sup>34</sup> The report structure reflects the City’s interest in analyzing the CSC program’s effect on crime rates in areas with cameras to identify potential deterrence, and the City’s interest in understanding the utility of the CSC program footage in investigating and charging crimes.<sup>35</sup>

Contemporaneous statements clarify that the City was particularly interested in using the CSC program to deter violent crimes. This conclusion is supported by the documents we reviewed. There was nearly unanimous agreement among interview subjects that deterring violent crime was the CSC program’s primary goal from conception through institutionalization.<sup>36</sup> Specifically, the City hoped the CSC program would deter homicides and violent felonies, especially those committed with guns. Accordingly, locations that had significant rates of violent crime<sup>37</sup> were selected to receive CSC program cameras. Subsequent to the passage of the Ordinance, the first proposal to expand the CSC program that the MOCJ made to the Police Commission cited the number of *violent crimes, and in particular homicides*, at the proposed camera locations.<sup>38</sup>

As Police Commissioner Thomas Mazzucco stated at a 2008 hearing, “People are probably more worried about drug dealers on the corner—they’re creating the violence in the neighborhood, as opposed to having their cars broken into.”<sup>39</sup>

## Investigating and Prosecuting Crime

*“We need to make sure if this system is in place that it is effective in helping solve crime. . . . [T]he SFPD needs every tool they can get to help reduce the homicide rate and help reduce violent crime in the City.”*

—Police Commission President Teresa Sparks,  
Police Commission Hearing, April 4, 2008

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<sup>34</sup> 19 S.F., CAL., ADMIN. CODE § 4(d) (2006).

<sup>35</sup> Indeed, this report provides a detailed analysis of crime statistics across a range of crimes from both the camera locations and adjacent control areas from 209 days prior to the installation of the first cameras in 2005 to January 2008.

<sup>36</sup> Only a few subjects mentioned nonviolent crimes as a goal of the CSC program, and that was within the context of the “broken windows” theory of crime, where lesser quality-of-life offenses are seen as contributing to an environment of disorder that precipitates more serious crimes. The broken windows theory is the guiding principle behind the policing changes in New York City during the mid- to late 1990s.

<sup>37</sup> This is according to sources we spoke with; the 2006 Ordinance is silent as to the type of crime the CSC program is intended to focus on; the only definition of crime is “substantial crime.”

<sup>38</sup> Letter to San Francisco Police Commission from MOCJ, RE: Proposed Safety Camera Installations, December 28, 2006. Available at <http://www.sfgov.org/site/uploadedfiles/mocj/CrimeDataforCommunitySafetyCameras.pdf>

<sup>39</sup> City of San Francisco Police Commission Hearing, April 2, 2008.

*“The cameras apparently are not being used like the police thought they’d be used, to help convict people. But I think justice is not about convicting people. Justice is about finding the truth, and in this case, the cameras found the truth.”*

—Public Defender Kwixuan Maloof discussing use of CSC program footage on behalf of a client accused of murder<sup>40</sup>

*“Policies governing access to evidence from the cameras also should be crafted to protect the innocent as well as to prosecute the guilty.”*

—San Francisco’s Public Defender Jeff Adachi<sup>41</sup>

Deterring crime, specifically violent crime, is the center of the City’s policing objectives for the CSC program. However, the CSC program was also viewed as a potentially useful tool in investigating and prosecuting crimes. As the program matured and additional participants in the criminal justice system became aware of it, the goal of supporting criminal investigations and prosecutions and eventually criminal defense became a more explicit objective of the system. Amendments to the Ordinance that address the needs of defense counsel reflect the City’s interest in using the CSC program as an investigatory and evidentiary tool. For example, the CSC Ordinance was amended to add an explicit process through which defense counsel could gain access to camera footage related to a specific criminal charge.<sup>42</sup> Prior to this amendment, defense counsel, like other agencies or individuals, could seek a court order to access CSC program footage under the Ordinance<sup>43</sup> or could use other mechanisms in the criminal discovery process, but there was no specific mechanism under the Ordinance.<sup>44</sup> The general retention period for camera footage was extended to thirty days to support the needs of criminal defendants and their representatives<sup>45</sup>; however the City currently lacks the storage capacity to retain CSC program footage for this time period, and thus currently retains it for seven calendar days.<sup>46</sup> Collectively, the changes to the Ordinance reflect increased attention to the investigatory and evidentiary potential of the CSC program.

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<sup>40</sup> Noyes, Dan. “Anti-crime cameras vindicate murder suspects.” San Francisco (KGO) ABC 7, August 15, 2008. Available at <http://abclocal.go.com/kgo/story?section=news/iteam&id=6331240>.

<sup>41</sup> Adachi, Jeff. “Commentary: Community, not just technology, needed in crime prevention,” *San Francisco Chronicle*, September 13, 2006. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/09/13/EDG6PKDT6K1.DTL&hw=adachi+camera&sn=003&sc=819>.

<sup>42</sup> City of San Francisco Ordinance 32-08, amending San Francisco Administrative Code Chapter 19, §§ 3 and 6. Available at <http://www.sfgov.org/site/uploadedfiles/bdsupvrs/ordinances08/o0032-08.pdf>.

<sup>43</sup> 19 S.F., CAL., ADMIN. CODE § 6(d) (2008).

<sup>44</sup> According to Public Defender Jeff Adachi, prior to the amendments there had been about a dozen instances when his office had requested tapes but they were either erased or not provided. Wyatt Buchanan, “S.F. may let suspects get surveillance video,” *San Francisco Chronicle*, February 27, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/02/27/BAQLV94AS.DTL&hw=adachi+camera&sn=005&sc=499>.

<sup>45</sup> Ordinance 32-08, p. 1.

<sup>46</sup> [Per](#) CITRIS interviews with DTIS staff.

## Secondary Objectives

The rich and lively debate surrounding the CSC program from its inception as well as the Ordinance itself were animated by a set of salient secondary objectives that reflect other values the City seeks to protect. While support was voiced for the CSC program, concerns about civil liberties, constitutional rights, and community participation were raised consistently during the pilot phase as well as during the debate and passage of the Ordinance. For example, although Supervisor Tom Ammiano expressed concerns about civil liberties, he supported the camera program on a test basis as long as safeguards promised by Mayor Gavin Newsom were in place to protect privacy, such as a prohibition on pointing the cameras inside people's homes or at residential doorways.<sup>47</sup> Similarly, while Supervisor Ross Mirkarimi expressed his belief that the cameras in his Western Addition district made people feel safer, he also expressed concerns with the program's lack of public oversight and community involvement.<sup>48</sup> Later that year Supervisor Mirkarimi requested that the city attorney draft legislation instituting enforceable guidelines to ensure that civil liberties and constitutional rights were not being abused or compromised as a result of the operation of the Community Safety Camera program.<sup>49</sup> On June 6, 2006 Supervisor Mirkarimi led the Board of Supervisors to pass the first version of the City's Ordinance governing use of surveillance camera footage.<sup>50</sup>

These secondary objectives are reflected in both procedural and substantive limitations placed on the growth and use of the CSC program. Among them:

- Community Participation—including public discussion about the expansion of CSC program, notice to individuals in areas under surveillance, a test that requires the consideration of the affected community's concerns, and a requirement that significant support from the affected community exists for a proposed camera installation.
- Accountability and Oversight—including constraining the CSC program to the investigation, prosecution and defense of specific crimes, processes that facilitate auditing, and annual reporting on the program's use and effectiveness.

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<sup>47</sup> Rachel Gordon, "Mayor wants additional surveillance cameras," *San Francisco Chronicle*, October 24, 2005. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2005/10/24/BAGA0FCQQ91.DTL>.

<sup>48</sup> Id.

<sup>49</sup> City of San Francisco Board of Supervisors Meeting, November 15, 2005. Minutes available at <http://www.sfgov.org/site/uploadedfiles/bdsupvrs/minutes/m111505.htm>.

<sup>50</sup> City of San Francisco Ordinance 127-06, amending the San Francisco Administrative Code to create Chapter 19, §§ 1–8. Available at <http://www.sfgov.org/site/uploadedfiles/bdsupvrs/ordinances06/o0127-06.pdf>.

- Protection of Privacy, Freedom of Expression, and Related Rights—including limiting the areas under surveillance, forgoing real-time monitoring of cameras, and turning cameras off during demonstrations.

## **Community Participation**

The Ordinance reflects the City’s commitment to fostering community awareness and participation in the development of the CSC program and to ensuring the consideration of other community values in decisions about camera placement.

### *Community Awareness and Participation in the Process*

Passage of the Ordinance itself is a testament to the City’s objective of ensuring the public’s participation in the approval of the CSC program in its entirety. The Ordinance gives the “affected community” a privileged role in the deliberation about whether to approve the installation of new CSC program cameras. While the public broadly can participate in deliberations about the CSC program, several provisions in the Ordinance require that the concerns and support of the “affected community” for the CSC program cameras be given careful consideration. The term *affected community* is not defined in the Ordinance. However, a provision that allows MOCJ, at its discretion, to provide additional notice through mailed notices of a proposed installation sheds some light on the meaning of affected community. If MOCJ provides mailed notices, it is required to send them to “(1) The owner of each property within 300 feet of the proposed camera location as reflected on the latest Citywide Assessor roll. (2) Neighborhood associations and organizations listed with the Planning Department as representing businesses, owners or occupants located within 300 feet of the proposed camera location, and (3) To the extent practicable, the occupants of each property within 300 feet of the proposed camera location.”<sup>51</sup> At the very least these individuals and entities can be inferred to be within the scope of the “affected community.”

The consideration of whether to install additional cameras under the CSC program begins with the submission to the Police Commission by MOCJ of a written report, containing “for each proposed new camera location: (1) the reason for installing the camera at the particular location, including crime

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<sup>51</sup> 19 S.F., CAL., ADMIN. CODE § 5(b)(1-3) (2006).

statistics for the area and (2) the proposed area/range to be covered.”<sup>52</sup> The director of MOCJ may only make a recommendation to the Police Commission to install CSC program cameras where he or she finds “that a particular location is experiencing substantial crime and that the potential to deter criminal activity outweighs any concerns asserted by the affected community.”<sup>53</sup> The Police Commission must then hold a public hearing about the proposed camera installation.<sup>54</sup> The Police Commission must weigh “any concerns asserted by the affected community” against the potential of the proposed camera installation to deter criminal activity.<sup>55</sup> It can approve an installation if there is “significant support from the affected community for the camera.”<sup>56</sup> Thus the affected community’s perception of the costs and benefits of an installation are an essential element in the City’s decision about the CSC program.

To ensure that the public, and specifically the affected community, has a voice in the proceedings, the ordinance requires the City to give public notice via signs in the area of the proposed installation and if it chooses, through mailings to individuals and entities with an interest within 300 feet of the proposed installation.<sup>57</sup> At least twenty days before a new camera installation is even *considered* by the Police Commission, a minimum of four signs—of a standardized content and size—must be posted within a 100-foot radius of the proposed site.<sup>58</sup> The MOCJ may also mail notices directly to entities in the vicinity of the proposed installation; if it chooses to do so, it must send mailings to local property owners, neighborhood associations, and organizations representing businesses.<sup>59</sup>

The Ordinance thus reflects the City’s desire to be transparent, responsive, and accountable to the specific communities in which cameras are to be installed. It also embodies an objective of balancing a wide range of interests that the affected community believes relevant to the decision about installing cameras. It facilitates this through the provision of information about crime statistics, public notice of the proposed installation, a public hearing process, and tests that specifically require the MOCJ and the Police Commission to consider the interests of the affected community.

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<sup>52</sup> 19 S.F., CAL., ADMIN. CODE § 4(b) (2006). The report must be distributed to the Police Commission and the public “20 days prior to the first public hearing on the proposed installation.” *Id.*

<sup>53</sup> 19 S.F., CAL., ADMIN. CODE § 4(a) (2006).

<sup>54</sup> 19 S.F., CAL., ADMIN. CODE § 4(b) (2006).

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> 19 S.F., CAL., ADMIN. CODE § 5(a-b) (2006).

<sup>58</sup> 19 S.F., CAL., ADMIN. CODE § 5(a) (2006).

<sup>59</sup> 19 S.F., CAL., ADMIN. CODE § 5(b) (2006). Those to be notified include “(1) The owner of each property within 300 feet of the proposed camera location as reflected on the latest Citywide Assessor roll. (2) Neighborhood associations and organizations listed with the Planning Department as representing businesses, owners or occupants located within 300 feet of the proposed camera location, and (3) To the extent practicable, the occupants of each property within 300 feet of the proposed camera location.” *Id.*

### *Ongoing Transparency: Notice*

Once approved CSC program cameras are installed, a “conspicuous” sign must be placed within twenty-five feet of the new camera or cameras, notifying the public that the area is under surveillance.<sup>60</sup> In addition, the cameras themselves must be installed “at fixed locations in an open and obvious manner” so that local residents will be aware of their existence.<sup>61</sup> Broader public notice of CSC program cameras is to be facilitated through the SFPD’s website, which must include “the location of all (CSC program) cameras installed throughout the City” and must be updated within thirty days of each new camera installation.<sup>62</sup> Both SFPD and DEM maintain a current list at their respective websites along with a request form for obtaining camera footage for authorized requestors.<sup>63</sup>

### **Accountability and Oversight**

Ordinance provisions embody the City’s objectives to be accountable for the performance of the CSC program as a whole, and with respect to specific instances of its use. The CSC program, both cameras and footage, is in the hands of entities other than the SFPD: DTIS and DEM respectively. Regardless of how this structure evolved, it is leveraged in the Ordinance to create hooks for monitoring and auditing the use of the cameras and the footage. For example, access to the recorders for community safety cameras for purposes of installation, repair, maintenance, and upgrades is limited to DTIS personnel.<sup>64</sup> Requests for CSC program footage must be documented in writing<sup>65</sup> and DEM is responsible for ensuring that footage is released in accordance with the statute. Police investigators may only obtain copies of CSC program footage for specific crimes and defense counsel may only obtain copies of CSC program footage in the context of investigating charged cases.<sup>66</sup>

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<sup>60</sup> 19 S.F., CAL., ADMIN. CODE § 5(c) (2006).

<sup>61</sup> 19 S.F., CAL., ADMIN. CODE § 2 (2006).

<sup>62</sup> 19 S.F., CAL., ADMIN. CODE § 5(c) (2006).

<sup>63</sup> The SFPD web page is available at [http://www.sfgov.org/site/police\\_index.asp?id=93194](http://www.sfgov.org/site/police_index.asp?id=93194). The DEM web page is available at [http://www.sfgov.org/site/ecd\\_index.asp](http://www.sfgov.org/site/ecd_index.asp).

<sup>64</sup> 19 S.F., CAL., ADMIN. CODE § 6(a) (2006).

<sup>65</sup> There is an exigent circumstances exception but it requires a subsequent written request to be filed. 19 S.F., CAL., ADMIN. CODE § 6(c) (2006).

<sup>66</sup> Defense counsel may only access footage related to a charged criminal offense, but SFPD investigators may access footage relevant to investigating a specific crime.

The SFPD is required to prepare an annual report to the Board of Supervisors and the Police Commission that includes the “camera locations, the crime statistics for the vicinity surrounding each camera both before and after the camera is installed, crime statistics from surrounding vicinities, the number of times the SFPD requested copies of the recorded images, the number of times the images were used to bring criminal charges, the types of charges brought, and the results of the charges.”<sup>67</sup> A resolution passed in 2008 authorized this CITRIS evaluation to stand in for the SFPD’s report.<sup>68</sup> To our knowledge San Francisco is alone among U.S. cities in requiring this information to be collected and provided to an external oversight body. Based on the required report the Police Commission may order the removal of any individual camera.<sup>69</sup>

The structure set out in the Ordinance creates some degree of transparency over system use, and by generating records of system use facilitates audits that can identify potential misuse and support an analysis of the program’s utility as a whole. The reporting requirement provides information to support an analysis of the use and effectiveness of the CSC program. Together the various provisions of the Ordinance provide checks on the program’s use, data to facilitate decision making about the program, and a structure for external oversight.

## **Protecting Privacy and Associated Rights and Interests**

*“Let me also say, for those people who are primarily concerned with First Amendment rights and privacy, which was, after all, our original concern, that the department, or the city of San Francisco cannot release these tapes to any other party without a court order. And I think that should assure people that we are protecting people’s First Amendment rights and their privacy.”*

—Supervisor Gerardo Sandoval, City of San Francisco Board of Supervisors meeting, February 26, 2008

The City’s desire to limit intrusions on privacy and interference with freedom of expression and related rights is reflected in numerous Ordinance provisions as well as practices adopted to govern the CSC program. The decision to design the system as a forensic, passive recording system instead of an

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<sup>67</sup> 19 S.F., CAL., ADMIN. CODE § 4(d) (2006).

<sup>68</sup> City of San Francisco Board of Supervisors Resolution no. 71-08, extending deadline for report to March 20, 2008, and recognizing CITRIS’s participation in the report’s production. Approved February 12, 2008. Available at <http://www.sfgov.org/site/uploadedfiles/bdsupvrs/resolutions08/r0071-08.pdf>. Please note that a preliminary report was delivered to the Police Commission by CITRIS on March 20, 2008. The findings of this report supercede the preliminary report.

<sup>69</sup> 19 S.F., CAL., ADMIN. CODE § 4(d) (2006).



actively monitored system, where cameras are watched in real-time, was motivated at least in part by a desire to limit the effect of surveillance on individual privacy. In contrast, many other U.S. cities actively monitor crime cameras.<sup>70</sup> Mayor Gavin Newsom, the leading player in the deployment of the system, sought support for the CSC program by distinguishing it from camera systems using active monitoring in other cities such as Chicago: after reviewing the Chicago system Mayor Newsom said, “I’m not going to do it. It’s not me. That’s Big Brother.”<sup>71</sup>

The Ordinance restricts the positioning of CSC program cameras to protect privacy. For example, cameras must be placed to surveil “areas perceptible to the human eye from public streets and sidewalks only.”<sup>72</sup> Further, the cameras are limited “to film[ing] public streets, sidewalks or common areas of public housing complexes.”<sup>73</sup> There are also technological measures in place to block the cameras’ view into any residential windows that may fall within the cameras’ sights.<sup>74</sup> Responding to concerns about expressive and associational civil rights being potentially compromised, the Police Commission granted approval for additional cameras in 2007 on the condition that they are turned off during permitted demonstrations.<sup>75</sup>

The Ordinance establishes limits on the retention of CSC system footage and limits on the purposes for which footage may be accessed and the individuals who may access it. It allows defense counsel to request footage in connection with the investigation or defense of a charged criminal case, authorizes limits for the use of footage obtained by defense counsel to the defense in connection with the specific charged criminal case, and criminalizes the further disclosure of camera recordings received by defense counsel to anyone other than the defendant or an expert retained by the requester, or in a hearing or trial in the charged case with Court approval.<sup>76</sup> CSC program footage cannot be kept by DEM for longer than thirty days, though due to storage constraints recordings currently are only kept for seven calendar days. Recordings preserved for evidentiary purposes are retained along with the criminal case files by SFPD

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<sup>70</sup> While police officers typically monitor such cameras, as of 2007 the City of Baltimore used civilian employees for the municipal portion of its system. Some cities also use retired officers (which may fall under the category of civilians).

<sup>71</sup> Bulwa, Demian. “New criminal justice chief wants cops monitoring cameras,” *San Francisco Chronicle*, February 7, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/02/07/BAPEUTF5K.DTL>.

<sup>72</sup> 19 S.F., CAL., ADMIN. CODE § 3 (2008).

<sup>73</sup> 19 S.F., CAL., ADMIN. CODE § 2 (2006).

<sup>74</sup> Per interviews with DTIS staff.

<sup>75</sup> Minutes are available at <http://www.sfgov.org/site/uploadedfiles/police/commission/Meetings/minutes/2007/jan17mins.pdf>.

<sup>76</sup> 19 S.F., CAL., ADMIN. CODE § 3(b) (2008). Interviewed parties had a variety of opinions about the motivations behind this provision, which functions to limit the disclosure of information about individuals captured on CSC footage. It should be noted that this change was made after CSC footage was leaked to the *Chronicle*, which posted the footage on its website on January 28, 2008, <http://www.sfgate.com/cgi-bin/object/article?f=/c/a/2008/01/28/MN37TKH6O.DTL&o=0>

according to the department's record destruction schedule. Footage requested by defense counsel is required to be maintained by DEM for 180 days. The limits on data retention respond to both practical (cost of storage) and privacy-related concerns.

The limitations on use, access, and retention, along with the public process and overall limitations on the purposes for which CSC program cameras may be installed and used reflect the City's interest in protecting the privacy and related rights and interests of individuals.

## **Summary**

The City's CSC program is unique in many aspects, including the passive, forensic design of its camera system as well as its legal framework stipulating the inclusion of the affected community in the decision-making process, its approach to governance and oversight, and provisions to protect individuals' privacy and related rights and interests. The transparency and public oversight of the CSC program facilitated by the Ordinance far exceeds that of other U.S. systems the CITRIS team has reviewed. The City's experimentation with video surveillance technology has been informed by its desire to protect civil liberties and rights. The commitment to these secondary objectives has shaped the technology and policies that compose the CSC program and informed the manner in which the City has pursued its primary objectives.

The remainder of this report will explore the program in greater depth, and consider its effectiveness at meeting both the primary and secondary goals outlined in this chapter.

## Chapter 2: Empirical Evaluation of the San Francisco Crime Camera Interventions



Figure 2-1: Community Safety Cameras overlooking the 16th St. and Mission St. BART intersection

### Introduction

As we describe in Chapter 1, from the various sources we analyzed it is clear that the City's primary motivation in installing CSCs was the deterrence of violent crime, with other crimes being of secondary importance. In this section, we present an empirical evaluation of this strategy by analyzing crime rates at and near camera installation sites both prior to and after deployment.

In general, the use of video surveillance is both situational (highly influenced by place or location) and behavioral (aimed at modifying offender behavior); several evaluation studies have shown that it has had some success with very specific types of places, such as parking garages. With behavior, video surveillance's "primary preventative utility is to trigger a perceptual mechanism in a potential offender. It seeks to change offender perception so the offender believes if he commits a crime, he will be caught. In other words, [video surveillance] aims to increase the perceived risk of capture, a factor which, assuming the offender is behaving in a rational (or limited rational) manner, will de-motivate the potential offender."<sup>77</sup> For a broader discussion on the factors that influence how surveillance "works," we include a detailed theoretical discussion in Appendix I.

The City's strategy with respect to deterrence was to place visually obvious cameras in high-crime areas (specifically at intersections such that the cameras generally capture both views of the sidewalks and street); combined with signage, the fundamental assumption is that potential offenders would take note of the presence of the cameras and signs and ideally choose not to commit their crimes (at least at that location). Because the system is not monitored, active deterrence (such as deploying police officers to a location based on information gathered from a real-time video feed) is not possible; the system relies upon the future threat of being caught after the fact, if a crime is reported at a CSC location and investigated. It should be noted that the public is likely generally unaware of this fact; the CSC signs merely note that "all activities may be recorded," and press accounts have noted that most people are surprised to find that the cameras are not actively watched by SFPD.<sup>78</sup>

The camera locations, while all fitting the definition of areas of "substantial crime" (with the possible exception of the Coit Tower/Pioneer Park location), are uniform perhaps only in that respect. Site visits revealed a wide degree of variation in terms of traffic (vehicular and pedestrian), neighborhood features (centrally located versus geographically isolated, relative mix of residential versus commercial), and criminal focus (known gang territory vs. non-gang-related crime) which can be summarized as follows (note that this is not an exhaustive list of sites, and some sites may belong to multiple categories):

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<sup>77</sup> Ratcliffe, Jerry. Video Surveillance of Public Places. Problem-Oriented Guides for Police, No. 4. U.S. Department of Justice Office of Community Oriented Policing Services: 2006.

<sup>78</sup> Nevius, C.W. "It's a Crime SF Surveillance Cameras Are a Flop." *San Francisco Chronicle*, July 15, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/07/15/BAFS11P3VQ.DTL&hw=nevius+surveillance&sn=004&sc=851>.

- **Public Housing:** cameras placed in parking lots immediately outside areas of ingress/egress at public housing (Western Addition); cameras placed at intersections in areas bordering public housing or community centers located within central City neighborhoods<sup>79</sup> (Western Addition, Lower Haight); cameras placed at intersections within self-contained public housing areas<sup>80</sup> (Alemany, Bayview/Hunter’s Point).
- **Gang Territory:** cameras placed at known divisions between gang territory where violent inter-gang conflicts are common (Mission St. & 19<sup>th</sup> St., 26<sup>th</sup> St. & Treat St., 26<sup>th</sup> St. & Shotwell St.).
- **High-Crime/High-Traffic Areas:** cameras placed at intersections with a high amount of crime (including violent crime) and often a high amount of both vehicular and pedestrian traffic (16<sup>th</sup> St. & Mission St., 24<sup>th</sup> St. & Mission St., Bayview (3<sup>rd</sup> St. & Kirkwood, 3<sup>rd</sup> St. & Newcomb) Tenderloin neighborhood (Ellis St. & Jones St., Turk St. & Taylor St.), Ingleside (Geneva St. & Mission St.).

Finally, we must note that the SFPD employed several strategic initiatives focused on violence and gang activity reduction since 2005, predating the installation of the first Community Safety Cameras by nearly a year, according to SFPD Deputy Chief Kevin Cashman. Per Cashman, a primary impetus for the 2005 plan was an increase in gang violence in 2003–2004, which led the City to adopt an enforcement plan focused on the most violent neighborhoods and violent offenders in San Francisco.

The current violence reduction strategies in effect are multi-part, including:

- Expansion of the Gang Task Force to specifically target gang violence; per a 2004–2006 analysis, performed for the SFPD by Prof. Anthony Braga of the Kennedy School of Government and the U.C. Berkeley Center for Criminal Justice, gang members are responsible for 49 percent of homicides in San Francisco.
- Highly targeted enforcement, including focusing on the sixty most violent felons in San Francisco (as originally identified in 2005; the list is incrementally updated).

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<sup>79</sup> These areas are integrated into larger neighborhoods where both public housing residents and nonresidents from the larger community are likely to congregate or pass.

<sup>80</sup> These areas are self-contained, often isolated neighborhoods where both vehicle and pedestrian traffic is localized to residents and visitors with a specific destination in the neighborhood.

- A Narcotics Buy-Bust program, focusing on purchasing illegal narcotics from identified gang members; a primary goal is to obtain felony convictions, which allow for additional federal-level prosecution strategies and solve the issue of uncooperative witnesses because the primary witnesses are police officers.
- Operation Cease Fire, a multifaceted violence-prevention strategy intended to encourage nonviolent behavior by chronic violent offenders. SFPD participates in biweekly, multijurisdictional meetings with various unit heads from local, state, and federal agencies combating gang crime.
- Civil injunctions against identified members of criminal street gangs to reduce visible public nuisance by limiting activities and associating within a designated safety zone (i.e., gang turf).
- Cooperation with the U.S. Attorney’s Office to pursue federal prosecutions, when possible, as a result of Buy-Bust felony convictions; persons with felony convictions for violent crimes and/or narcotics offenses receive enhanced prison sentences for firearms violations. Because federal sentences are often served out of state, communication between gang members both in and out of prison can be disrupted.
- Informant-based gun-buy program.
- Identifying “at risk” juveniles by Gang Task Force and Juvenile Probation Department involved in street violence, to direct them toward intervention programs.
- Monitoring of prisoner telephone calls in the San Francisco City and County Jail system.

In February 2008, the violence reduction program was updated to include a “zone specific” strategy, which appears to focus strategic deployment of multiple policing resources on five geographic zones “to ensure maximum uniform and plainclothes presence in all zones at the same time”<sup>81</sup>: Tenderloin/SOMA, Western Addition, Mission District, Bayview (Potrero Hill, Hunter’s View housing, Alice Griffith housing), and Visitacion Valley. This strategy also includes increased focus on probation compliance

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<sup>81</sup> Per an SFPD report provided to CITRIS.

and searches (of the seventy suspects identified in homicide cases in 2004 and 2005,<sup>82</sup> 83 percent had previous histories with the criminal justice system), and increased traffic enforcement in the zones. According to Deputy Chief Cashman, these changes have led to a decrease in gun violence among gang members, but an increase in spontaneous gun violence related to disputes, particularly at night clubs. To that end, the department is also implementing “Operation Last Call” to focus on enforcement at night clubs in hot-spot areas.

It is important to note the contemporaneous existence of these strategies with the CSC program because all share the same goals: to reduce violent crime and gang activity in San Francisco. In the next section we will discuss the impact these strategies may have had, if any, on the empirical investigation we conducted. To the best of our knowledge, despite sharing similar goals the CSC program appears to have run independently of the tactical deployments of these strategic approaches.

## **Empirical Evaluation**

This section presents a statistical evaluation of the impact of installing Community Safety Cameras in nineteen locations throughout the City on the level of criminal activity in those areas within the cameras’ view, as well as criminal activity occurring in areas just beyond the cameras’ view. We assess whether the installation of CSCs impacted the level of serious felony offending defined in terms of the seven Federal Bureau of Investigation Part 1 felony offenses. These seven offenses of homicide, sexual assault, robbery, assault, burglary, larceny, and auto theft are commonly used as metrics of serious criminal offending in official statistics for the nation as well as for cities and individual neighborhoods.<sup>83</sup> We also test for an effect of the cameras on other types of offenses, such as vandalism, narcotics incidents, and prostitution.<sup>84</sup>

Our evaluation employs several quasi-experimental research designs to isolate the effects of this program intervention on criminal offending. First, we present a series of comparisons of pre-post installation changes in crime rates in areas within the immediate vicinity of the camera and areas just

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<sup>82</sup> In 2004–2005 there were 184 homicides in San Francisco; of these, approximately 77 percent were shootings. (Braga 2007)

<sup>83</sup> The FBI also defines arson as an eighth Part 1 felony offense. In this report, we focus on the more common measures of serious street crime, as arson is relatively infrequent.

<sup>84</sup> As per the City’s Ordinance, the SFPD is required to report on “the crime statistics for the vicinity surrounding each camera both before and after the camera is installed [and] crime statistics from surrounding vicinities.” In addition to providing an evaluation of the impact of the cameras on local crime rates, this report substitutes the SFPD’s report to fulfill this obligation for both 2007 and 2008. We provide estimates of average daily crime within the immediate vicinity of each camera location as well as estimates of changes in the immediate surrounding areas.

beyond the cameras' purview. Changes in crime rates within view of the cameras are driven by the impact of the cameras as well as the effects of any other changes in criminogenic conditions that determine the offending level (e.g., local trends, changing demographics, local economic conditions, etc.). In the absence of crime displacement, changes in crime rates in areas just beyond a camera's view should reflect only the effect of all other environmental factors impacting crime on the specific city block. To the extent that surveillance cameras deter criminal activity, the pre-post change in crime for the area within a camera's view should differ from the comparable change in the area beyond the camera's view, with crime declining in the area near the camera relative to crime in the adjacent area.

Our second set of tests exploits differences in the timing of the installation of the Community Safety Cameras to fashion comparison samples based on locations that did not receive CSCs during the evaluation window encompassing the before and after periods with locations that did. Specifically, nine of the nineteen camera locations received cameras in either 2005 or early 2006. Ten of the nineteen locations have installation dates between late 2006 and mid-2007. Thus, we are able to use changes in crime rates in the second set of locations but during the time period surrounding the installation dates for the first set of location (the early receivers) as benchmarks against which to compare crime changes among sites receiving new cameras. Similarly, we use changes in crime rates at sites receiving cameras early in our study period but measured for the periods surrounding the installation dates of late-receiving locations as a comparison sample for these late receivers. With these defined comparison samples we are able to assess whether the relationship between the before-after change in crime rates and distance from the camera differs between sites receiving cameras and sites that have yet to receive a camera or already have a camera.

Our final nonexperimental strategy exploits the fact that surveillance cameras are only likely to deter criminal incidents occurring in public places. Thus, if cameras deter criminal activity within their view, we should observe declines in crimes occurring in public places but no decline in crimes occurring in private places. For each of the two estimation strategies previously described, we present separate estimates for criminal incidents occurring in public places and for criminal incidents occurring in private areas or areas unlikely to be captured by the camera. A priori, a deterrent effect would predict a decline in crime in public places, but not in private places.

Our three evaluations strategies complement one another in that the weakness of one is addressed by the strengths of the others. While our pre-post installation crime rate comparisons in areas near the cameras relative to areas slightly further away allows us to detect whether there is a relative decline in



crime within view of cameras, this strategy does not permit identifying crime-displacement effects. However, our comparisons of pre-post changes in the areas receiving cameras to areas not receiving cameras during the relevant timeframe does permit an assessment of whether the changes in the more distant regions differ from those observed for similar areas not contemporaneously impacted by the program. The comparison of crimes occurring in public places to crimes occurring in private places provides a simple falsification check on the first two evaluation strategies. When each of the three strategies yields results consistent with a deterrent effect, we conclude that the Community Safety Cameras are reducing crime. The principal results of our analysis are the following:

- **Violent Crime:** We find no evidence of an impact of the CSCs on violent crime. Violent incidents do not decline in the areas near the cameras relative to areas further away, we observe no decline in violent crimes occurring in public places, and we observe no statistically significant differences in the relationships between the before-after change in crime and the distance from the camera locations for our locations receiving cameras and our comparison sites.
- **Homicides:** Analysis of specific violent crime rates reveals a decline in overall homicides in areas near the CSCs but increases in areas further from the cameras, suggestive of a displacement effect. However, disaggregating the data into homicides occurring in public as opposed to homicides in private areas yields little evidence of a decline in homicides near the cameras or a significant increase in homicides further from the cameras. Thus homicide patterns in the areas surrounding the cameras during the time period encompassing the camera installation dates are consistent with random variation in this crime series.
- **Property Crime:** We find statistically significant and substantial declines in property crime rates within view of the CSCs. Within 100 feet of camera locations, Part 1 felony incidents decline by 24 percent. We do not see corresponding declines in the immediately adjacent areas nor do we observe increases in property crime in these areas. When we analyze incidents occurring in public and incidents occurring in private places separately, we find statistically significant and substantial declines (on the order of 30 percent) near the cameras for crimes occurring in public only, and no relationship between distance

from the camera and the change in crime rates for property crime occurring in private locations. Finally, we do not observe corresponding relative changes in crime near the cameras for areas in our comparison sample. Thus, all three tests point to a significant deterrent effect of the cameras on property crime.

- **Part 1 Property Offenses:** Analysis of specific Part 1 property offenses reveals that the entire impact of the CSCs on property crime rates is occurring with regard to larceny theft. Included in this broad crime category are pickpocketing, purse-snatching, theft from buildings, and thefts from automobiles (though not automobile theft).
- **Drug Offenses, Prostitution, Vandalism, and Others:** We find no evidence of any effect of the CSCs on drug incidents, or evidence of any effect on prostitution, vandalism, and incidents described as suspicious occurrences.
- **Effects At Individual Camera Locations:** We present a limited set of site-by-site estimates of the deterrent effects of the cameras. We caution against reading too much into these estimates, as the degree of statistical uncertainty is fairly large. This lack of precision is driven by the much smaller sample of days used to tabulate average daily incidents before and after installation when we estimate relative impacts on a location-by-location basis rather than pooling all locations together. With this caveat in mind, we observe three locations where there are particularly significant declines in property crime near the cameras (26<sup>th</sup> and Treat Ave.; Haight and Webster; and the cluster of cameras at Jones and Ellis and Turk and Taylor). At the remaining locations, the estimates are too imprecise to rule out effects of the camera installations comparable in magnitude to those observed for the pooled locations sample. With regard to violent crime, the similar caveat applies. Nonetheless, we do observe two locations where there are statistically significant declines in average daily violent incidents in the area near the cameras but not in more distant areas (19<sup>th</sup> and Mission; Mission and Geneva).

## **Description of the Evaluation Methodology**

In this section we evaluate whether the installation of cameras deters criminal incidents and whether any such locally deterred criminal activity is displaced to immediately adjacent areas.<sup>85</sup> In particular, we employ a host of non-experimental estimation strategies to isolate the deterrent effects of the San Francisco crime camera program on local offending levels. While each of the three strategies we employ has its limitations, the estimation strategies complement one another, in that the strengths of one often address the weaknesses of another.

Installing surveillance cameras may influence local crime rates through several avenues. First, to the extent that those who commit crime are sensitive to the likelihood of being apprehended, the presence of a surveillance camera may deter criminal activity in the area captured by the camera. Whether such a local deterrent effect reduces overall crime rates will depend on whether the deterred offenders reduce their overall offending or simply choose a location outside of the camera's view. If the deterred offenders simply move down the street, crime will be displaced from the area covered by the camera to alternative areas of the city without video surveillance coverage. We will refer to this effect throughout this report as a crime-displacement effect.

Second, if CSCs aid in the apprehension and prosecution of perpetrators, CSCs may have an incapacitation effect. Alternatively stated, if camera surveillance is helpful in capturing and incarcerating individuals with a high propensity to offend, this additional surveillance tool may reduce local crime rates by incapacitating those individuals responsible for disproportionate shares of crime.

### *Evaluation Strategy 1*

Our first estimation strategy is to assess whether the before-after installation change in crime rates in areas receiving Community Safety Cameras depends on the physical distance of the area from the camera location. Presumably, surveillance cameras will deter crime in areas within but not beyond their view range. Thus, to assess whether cameras are having a deterrent effect, we estimate the change in crime rates for areas of varying distance from the cameras' locations.

Specifically, let  $Crime_{idt}$  be the number of daily criminal incidents occurring at camera location  $i$ , where  $i=(1, \dots, 16)$  indexes the sixteen location clusters that we will define below,  $d=(1, 2, 3, 4, 5)$  indexes distance groups for subareas defined by 100-foot concentric circles drawn around specific camera locations, and  $t$  indexes specific calendar dates. Define the installation date for cluster  $i$  by the variable

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<sup>85</sup> Assessing incapacitation effects is considerably more difficult because we wouldn't expect incapacitation to play itself out spatially within a block (proximity to cameras being a key aspect of our evaluation strategy).

$T_i$ . The before-after change in average daily crime rates for each of the distance clusters is given by the equations

$$\begin{aligned}\Delta_1 &= E(\text{Crime}_{i1t} | t \geq T_i) - E(\text{Crime}_{i1t} | t < T_i) \\ \Delta_2 &= E(\text{Crime}_{i2t} | t \geq T_i) - E(\text{Crime}_{i2t} | t < T_i) \\ \Delta_3 &= E(\text{Crime}_{i3t} | t \geq T_i) - E(\text{Crime}_{i3t} | t < T_i) \\ \Delta_4 &= E(\text{Crime}_{i4t} | t \geq T_i) - E(\text{Crime}_{i4t} | t < T_i)' \\ \Delta_5 &= E(\text{Crime}_{i5t} | t \geq T_i) - E(\text{Crime}_{i5t} | t < T_i)\end{aligned}$$

In this set of equations,  $\Delta_1$ ,  $\Delta_2$ ,  $\Delta_3$ ,  $\Delta_4$ , and  $\Delta_5$  give the before-after changes in average daily crime rates within 100 feet of a camera, within 100 to 200 feet of a camera, within 200 to 300 feet of a camera, within 300 to 400 feet of a camera, and within 400 to 500 feet of a camera.

To clarify our estimation strategy, we need to discuss the factors that determine these five changes in average crime rates. Beginning with the change in the immediate vicinity of the camera,  $\Delta_1$  will depend on (1) the effect of the cameras on crime rates within the 100-foot circle surrounding the cameras, (2) the impact of other changes in crime determinants that effect this area but not the remainder of the circle defined by the 500-foot radius surrounding the camera location under question, and (3) the impact of crime determinants that effect the entire area defined by the 500-foot radius. Based on our site visits to each of the camera locations, we concluded that the cameras' views do not extend beyond 100 feet. Thus, changes in the remaining areas ( $\Delta_2$ ,  $\Delta_3$ ,  $\Delta_4$ , and  $\Delta_5$ ) will depend only on (1) factors that impact the specific distance area only, and (2) crime determinants that influence the entire area define by the 500-foot concentric circle.

Our first estimation strategy involves comparing the change in crime within the cameras' view ( $\Delta_1$ ) to changes in crime in the areas outside of the cameras' view ( $\Delta_2$ ,  $\Delta_3$ ,  $\Delta_4$ , and  $\Delta_5$ ). All such changes will be impacted by crime determinants that have a common impact on the 500-foot area. Thus if crime in the specific area, or citywide, is trending in a specific direction, this will be reflected in each of the five crime-change tabulations. However, only the crime change in location one ( $\Delta_1$ ) will be impacted by a local deterrent effect associated with increased surveillance. Thus, our first empirical test is to assess whether crime declines in area one relative to areas two through five—in other words, do we observe  $\Delta_1 < \Delta_2$ ,  $\Delta_1 < \Delta_3$ ,  $\Delta_1 < \Delta_4$ ,  $\Delta_1 < \Delta_5$ ? To the extent that this is the case, we would have evidence that something is impacting crime in area one beyond all of the other determinants of criminal activity in the larger area surrounding the camera location.

The chief limitation of this strategy concerns the fact that it does not permit ruling out changes in crime determinants that differentially impact each of the five distance groups that we have defined. For example, if the CSC installation coincided with a change in lighting in area one or a shift of police patrolling resources to or away from area one, a relative change in crime near the cameras may be attributable to these other factors.<sup>86</sup> Most important, areas two through five may be impacted by criminal activity displaced from area one, a factor that would yield a larger relative decline in crime in area one. More generally, any factors that change during the study period that will impact one of the five regions but not the others (beyond the new deterrent effect in region one) will not be captured by this simple differencing.

Nonetheless, the multiple comparisons of region one to regions two through five should assuage this concern to some degree. One might argue that non-CSC-related factors that impact the change in criminal offending should be more similar in regions one and two than in regions one and five. In addition, one might also expect to see larger displacement effects further down the block (say 400 to 500 feet away) rather than just beyond the camera's view (for example, 100 to 200 feet away). Changes in crime that are similar across groups two through five would be inconsistent with this speculation. In the empirical work below, we draw many such multiple comparisons.

### *Evaluation Strategy 2*

If crime does not change in regions two through five, one may be less concerned that cameras are displacing crime to areas adjacent to those within camera view. However, no absolute increase would be consistent with a displacement effect if crime is trending downward citywide. That is to say, if crime is declining throughout San Francisco and we see no declines in areas two through five, the lack of change in these areas not captured by a CSC may reflect the displacement of crime from area one.

To address this issue, our second strategy exploits differences in the timing of CSC installation across the nineteen sites to identify comparison areas for each CSC location during the relevant pre- and post-installation periods, a camera was not installed. Specifically, define  $PRE_i$  as the number of days prior to CSC installation for which we have incident data for camera  $i$ , and  $Post_i$  as the number of days after installation for which we have data for camera  $i$ . Define  $PRE_m = \min(PRE_1, \dots, PRE_{16})$  as the minimum number of pre-installation days for which we have data on all CSC locations and

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<sup>86</sup> Note difference in lighting or patrolling or any other such factor across areas within the 500 foot circle that do not change over time will not impact this estimate, since our estimation strategy is based on the change in criminal activity rather than level of activity at a given point in time.

$Post_m = \min(Post_1, \dots, Post_{16})$  as the minimum number of post-installation days for which we have data on all locations. For each CSC location we define the installation *window* as the period corresponding to  $PRE_m$  days prior to the location-specific installation date and  $Post_m$  days following that date. For each CSC location, all other locations with an installation date outside of the specific location's installation window are used as a corresponding comparison sample. Thus for each location we have a comparison sample of locations that have either received a camera or will receive a camera on a date that lies outside of the interval  $(T_i - PRE_m, T_i + Post_m)$ .

Define the five changes  $\Delta_1^c, \Delta_2^c, \Delta_3^c, \Delta_4^c,$  and  $\Delta_5^c$  as the pre-post changes in crime rates in the comparison samples, where each change is measured for distance groups defined either by where the CSC was installed prior to the relevant installation window or by where the CSC will be installed at some date after the relevant window closes. To assess whether the changes in crime corresponding to installation of a CSC differ from crime trends in the comparison areas, we calculate the following difference in the differences, or

$$\Delta_1^2 = \Delta_1 - \Delta_1^c$$

$$\Delta_2^2 = \Delta_2 - \Delta_2^c$$

$$\Delta_3^2 = \Delta_3 - \Delta_3^c$$

$$\Delta_4^2 = \Delta_4 - \Delta_4^c$$

$$\Delta_5^2 = \Delta_5 - \Delta_5^c$$

These five difference-in-difference (DD) estimators test whether the change observed in each of the distance groups in areas receiving a CSC installation differs from the corresponding observed change in crime rates in the comparison sample. If Community Safety Cameras are having a real local deterrent effect, we would expect  $\Delta_1^2 < 0$ . Moreover, if locally deterred crime in area one is displacing crime into areas two through five (leading to increases in crime beyond any citywide trends) we would expect or see either  $\Delta_2^2 > 0,$   $\Delta_3^2 > 0,$   $\Delta_4^2 > 0,$  or  $\Delta_5^2 > 0,$  or some combination thereof.

The relative benefit of this alternative estimation strategy is that the changes in crime in the comparison samples provide a benchmark not only for area one but also for areas two through five. One important shortcoming, however, is that the comparison areas are not necessarily identical to the

treatment areas.<sup>87</sup> We can address this issue somewhat by estimating a multivariate version of the DD estimators that allows for site-specific intercepts. Below we estimate the equation:

$$Crime_{cidt} = \alpha_{cj} + \delta_i + \beta_d T_{cidt} + \lambda_d After_{cidt} + \gamma_d T_{cidt} After_{cidt} + \varepsilon_{cidt}$$

where the dependent variable is defined as above but where we have added the subscript  $c$  to index a specific treatment-comparison group (sixteen in all);  $T_{cidt}$  is a dummy variable set to one for observations in the treatment group and zero for observations in the control group;  $After_{cidt}$  is an indicator variable equal to one for an observation in the post-installation period and zero otherwise; and  $\varepsilon_{cidt}$  is a mean-zero random disturbance term. In this specification the relative change in crime rates is given by the coefficient estimate  $\gamma_d$ , which is equivalent to the regression-adjusted DD calculation. The key control variables in the specification are a complete set of location-specific fixed effects,  $\delta_i$ , which adjust for any fixed difference in crime rates across locations, and a set of fixed effects for thirty-day periods within each comparison sample, given by  $\alpha_{cj}$ , where  $j$  indexes the set of thirty-day periods definable on the time interval  $(T_c - PRE_m, T_c + Post_m)$ . Note that the time effect eliminates any seasonal patterns in the crime data specific to each of the treatment-comparison groupings.

### *Evaluation Strategy 3*

Our final evaluation strategy involves estimating slight variations of the models laid out thus far. The strategies we have already set forth can be applied to crime rates of various levels of specificity (for example, in terms of the type of offense as well as the circumstances surrounding the incident). Our final evaluation strategy involves stratifying the offenses we observe into two groups where a priori we would expect to see a larger impact of the cameras on one group of criminal offenses relative to the other. By applying strategies one and two to the data stratified in this manner, we can assess whether this a priori theoretical prediction is borne out, and in the process increase certainty as to the interpretation of our unstratified results.

The incident data provided to us by the San Francisco Police Department includes information on the location of the incidents, and one might expect local deterrent effects to operate only on criminal offending occurring within public spaces visible to the CSCs. One would not expect criminal activity occurring in private areas or public areas not within the cameras' view to be impacted. Thus our final strategy involves defining incidents that occur in public spaces more likely to be captured by a CSC and

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<sup>87</sup> Note, however, that our strategy does result in a very large overlap between sites used in the treatment sample and sites used in the comparison sample. We will discuss this in greater detail in the data section to follow.

incidents occurring in spaces unlikely to be captured by a CSC, and re-estimating the models laid out in our first two evaluation strategies for each of these more restrictive dependent variables. Evidence consistent with a real impact of the cameras on crime would involve observing patterns for crimes occurring in public spaces that differ from those for crimes occurring in private spaces.

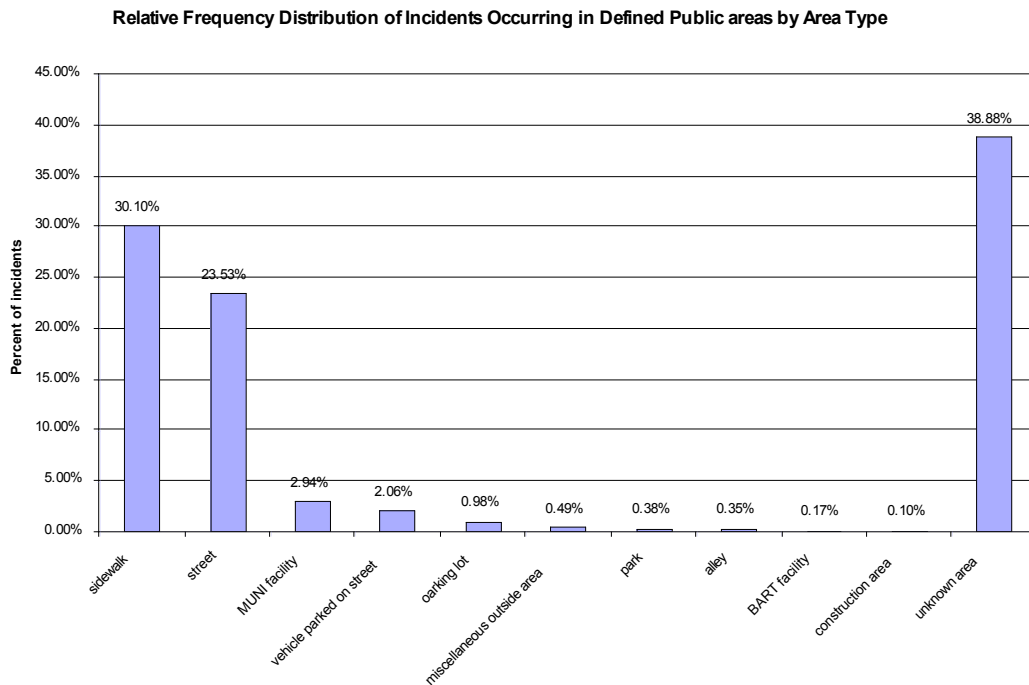


Figure 2-2

Figure 2-2 shows the distribution of incidents defined as occurring in public places by area type. Using the incident coding provided by the SFPD, we define as occurring in public places all incidents where the location is described as occurring on the sidewalk (30.1% of all Part 1 felony incidents in our public spaces subsample), street (23.53%), MUNI facility (2.94%), vehicle parked on street (2.06%), parking lot (0.98%), miscellaneous outside area (0.49%), park (0.38%), alley (0.35%), BART facility (0.17%), and construction area (0.1%) or where the location was unknown (38.88%). We define all other incidents as occurring in private locations or locations unlikely to be captured by a camera. Figure 2-3 displays the major area types and their relative importance in this category.<sup>88</sup> Using these definitions,

<sup>88</sup> Roughly 92% of the incidents that we define as occurring outside of the camera’s view have locations described as (in proportional order of importance for this subsample) apartment (41.59%), miscellaneous building-store (15.3%), hotel, motel (8.05%), house (6.98%), public housing (4.74%), bar (4.47%), restaurant (4.2%), liquor store (1.43%), residential garage (1.43%), house-multiple dwelling (1.25%), commercial office (0.98%), drug store (0.98%), and religious premises (0.98%). The remaining 7% of incidents are all in categories that individually account for less than 1% of incidents. These additional categories are department store (0.89%), school, other (0.81%), flat (0.63%), grocery store (0.63%), laundromat (0.45%), public garage (0.45%), theatre (0.45%), service station (0.36%), supermarket (0.36%), bank (0.27%), hotel lobby (0.27%),



roughly 72% of property crimes in our main analysis sample and 73% of violent crime occur in public places.

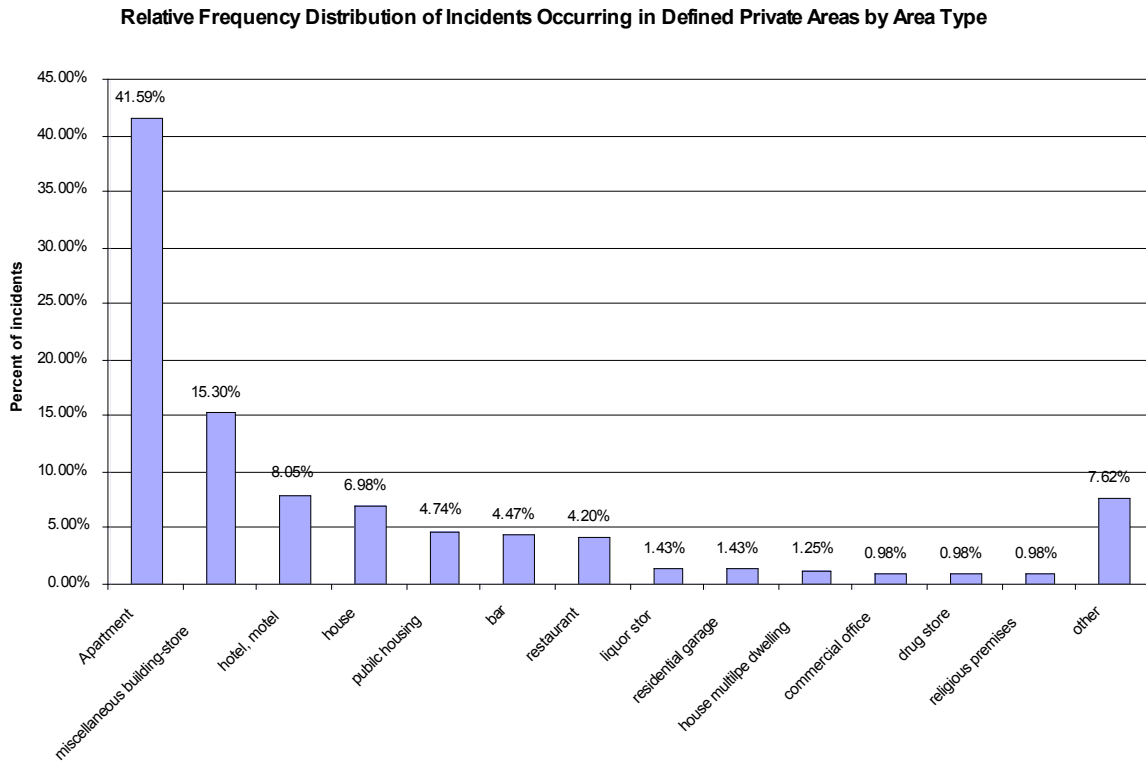


Figure 2-3

### Comparing the Three Strategies

These three evaluation strategies have relative strengths that complement one another. Evaluation Strategy 1 compares crime changes within view of a camera to crime changes just beyond the camera’s view. This strategy’s strength is that the areas immediately adjacent to those impacted by a camera installation are likely to be subject to similar conditions and changes in conditions that impact local crime rates (since the defined comparison groups basically are on the same block or the next block over from the specific area newly under surveillance). The weakness of this strategy, however, is that in the event that the cameras are displacing crime, a relative decline in crime around a camera installation is consistent with either the cameras causing an absolute decline in crime or the cameras simply displacing criminal activity down the street.

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residential treatment facility (0.27%), hallway (0.18%), jewelry store (0.18%), motel room (0.18%), playground (0.18%), public restroom (0.18%), taxi (0.18%), government agency (0.09%), group home (0.09%) medical office (0.09%), MUNI electric bus (0.09%), pawn shop (0.09%), school, elementary (0.09%), warehouse (0.09%), waterfront area (0.09%).

Estimation Strategy 2 addresses the weakness in the first strategy by providing a benchmark set of crime changes in areas that will eventually receive a camera or already have one. The comparison sample provides some sense of what we would have expected to see in the more distant regions of impacted areas if the CSCs had not been installed. However, the comparison sample chosen may differ in many respects from the treated areas, and thus the quality of the comparison sample and the resulting effect estimates will depend on the quality of this match.

Estimation Strategy 3 complements the prior two evaluation strategies by honing in on a more specific set of circumstances under which we would expect Community Safety Cameras to matter, and by using the simple theoretical proposition that CSCs shouldn't matter to crime that can't be seen by the camera, thereby providing a basic falsification check of the results from the first two strategies.

In the following subsections we use each of these strategies to test for an impact of CSC installations on criminal activity of various types. When all three strategies yield evidence consistent with an effect of cameras on crime, we conclude that the CSCs have had a local deterrent impact on crime.

#### *Potential Confounding Factors*

Our methodological approach to the CSC evaluation involves (1) comparing changes in crime near the camera sites to changes in crime outside of the CSC's view, (2) comparing the relationship between distance from a CSC and the pre-post change in crime in the treated areas to the comparison areas not receiving a CSC during the corresponding time period, and (3) applying both comparisons to crimes occurring in public places and crimes occurring in private places unlikely to be captured by a CSC. The combination of the three strategies effectively adjusts our estimated effects for changes in factors impacting crime in the entire 500-foot area surrounding the Community Safety Cameras as well as general corresponding crime trends in the City. As we discussed in our methodology section, the approaches we take would not capture changes in crime-related factors that impact our 100-foot-area slices differentially. For example, if lighting were to improve along with the cameras or if patrolling routes were to change such that one area received more attention than the other, our analysis could be missing the impact of some confounding factor and could falsely attribute the patterns we observe to the introduction of the CSCs.

While it is difficult for us to identify all factors that may have changed in a non-neutral manner across the areas within 500 feet of a CSC, we can comment on a few of the most important possibilities. We asked the City whether lighting had been changed in any of the areas covered by a CSC. To the extent that improved lighting deters criminal activity, such a change may confound our evaluation

results. We were informed that the city did indeed increase lighting at 1150 Pierce between Eddy Street and Turk Street as well as at 1150 Scott Street between Eddy Street and Turk Street. These improvements occurred in summer 2007. There were also some lighting improvements in Hunter's Point in April 2008. Regarding the first lighting increase, all of the CSCs that are close to these lighting improvements (at Eddy and Buchanan, Eddy and Pierce, Scott and Eddy, and Turk and Scott) received cameras in either 2005 or early 2006. Each installation date occurred more than 264 days prior to the lighting improvement. Hence, this particular change does not impact our analysis. The second lighting improvement (in April 2008) occurs several months after the latest date in our data extract. Hence, this change as well is inconsequential. Thus, to the best of our knowledge there were no changes in lighting during our study period that would confound our estimates.

Regarding changes in patrol routes or other changes in policing strategies, we have no information on how changes in patrol routes or other targeted policy efforts may have differentially impacted areas within 500 feet of the Community Safety Cameras. As we note in the introduction to this chapter, the SFPD has been quite active in attempting new, targeted strategies to control violent crime. However, the strategies that we discuss (targeting known offenders, injunctions, hot-spot policing) are all innovations that do not appear to focus on specific street corners or subareas of the relatively small regions that we analyze, though they do focus generally on the surrounding areas. Of course, while we cannot rule out a differential change in policing practices within these areas, we believe that this is a minor qualification to the conclusions that we draw.

## **Data Description**

The SFPD provided us with a data set describing 76,930 incidents occurring within 1,000 feet of nineteen CSC locations. The data query involved pulling all incidents within 1,000 feet of each CSC location occurring between January 1, 2005 and January 28, 2008. Since many of the cameras are within 1,000 feet of one another, the structure of this query produced many duplicate incident counts—for example, an incident occurring in the 1700 block of Mission St. would be recorded as occurring within 1,000 feet of both the 16<sup>th</sup> and Mission and the 19<sup>th</sup> and Mission locations. We tabulate that there are 59,706 independent incidents occurring within 1,000 feet of the camera (that is to say, 78 percent of the total incident count represents independent events with the remainder being duplicates).

We impose several restrictions on the data set that largely eliminate this double-counting problem. First, we restrict our analysis to incidents occurring within 500 feet of one of the nineteen CSC locations. This greatly reduces the overlap in the analytical areas surrounding each location. For example, the 500-foot concentric circles around the 16<sup>th</sup> and Mission and 19<sup>th</sup> and Mission locations do not overlap while the 1,000-foot concentric circles do.

Second, for each camera location we restrict our analysis to incidents occurring during the 209 days prior to camera installation and the 264 days following. The length in days of the chosen pre- and post-periods are the maximum number of days for which we have pre and post data for all nineteen camera locations. Since several of the Community Safety Cameras that are in close proximity to one another have installation dates that differ by more than a year, imposing the time restrictions eliminates many of the remaining double-counted incidents. Moreover, since several of the locations near one another have installation dates that differ by more than 264 days, there will be many instances where it will indeed be analytically correct to count incidents more than once.<sup>89</sup> Imposing these two restrictions reduces the proportional importance of incorrectly double-counted incidents from 22 percent of observed incidents to less than 5 percent of observed incidents.

The remaining incorrectly double-counted incidents occur near CSC locations that are within 500 feet of one another and where installation dates are chronologically close. We deal with these remaining double-counted incidents in the following manner. For CSC locations that are within 500 feet of one another and have installation dates that are less than three months apart, we define subsuming location clusters. For criminal incidents reported more than once within a cluster, we retain the record with the minimum distance to a CSC location and discard the remaining duplicates. This specification choice means that the union of the surveillance areas and of the individual cameras will define the surveillance areas around CSC clusters, with more distant areas only defined as such if they are not covered by a closer CSC location. That is to say, a location within 50 feet of one camera within a given cluster but 500 feet from another camera in the same cluster is classified as being within 50 feet of the camera

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<sup>89</sup> To illustrate this point, consider the following example. Suppose that locations A and B are 500 feet apart, and that the camera installation date for location A occurs 270 days prior to the installation of cameras at location B. Consider a criminal incident occurring 100 days after the installation of cameras at location A (thus occurring both in A's post-period and B's pre-period) that occurs within 500 feet of both locations. To accurately measure crime levels in area A, post-camera installation, we must include this incident. Moreover, the post-period for A will not be influenced by the installation of cameras at B, since new cameras at B arrive six days beyond the close of the post-period for A. Similarly, to accurately measure crime levels in area B prior to the installation of cameras, we must include the incident in question. Moreover, changes in surveillance at location A will not influence our pre-installation crime estimate for region B, since the installation date for region A occurs 61 days prior to the opening of the pre-period for region B.

cluster. In addition, in order for a location to be classified as 500 feet from a camera, it must be at least 500 feet from all cameras.

Table 1 lists the nineteen locations receiving Community Safety Cameras along with their installation dates and our defined CSC clusters. The locations are spread throughout the City, with locations in the Western Addition, the Mission District, the lower Haight, the Tenderloin, Alemany, Bayview-Hunter's Point, and Coit Tower. The installation dates vary greatly across locations, with the earliest installation on July 29, 2005 and the latest on May 11, 2007. Regarding our defined location clusters, note that for fourteen of the nineteen locations the cluster consists only of the single site. The remaining five sites are grouped in two multiple-site clusters: cluster 12 that includes the Eddy and Pierce Streets, Scott and Eddy Streets, and Turk and Scott Street locations, and cluster 14 that includes the Jones and Ellis Streets and Turk and Taylor Street locations.

| <b>Table 1</b>   |                          |                |
|--|--------------------------|----------------|
| <b>Surveillance Camera Locations, Installation Dates, and Cluster Categorization</b> |                          |                |
| <b>Location</b>  | <b>Installation Date</b> | <b>Cluster</b> |
| Telegraph Hill   | 12/18/2006               | 1              |
| 1050 McAllister  | 3/27/2007                | 2              |
| 16th & Mission   | 2/15/2007                | 3              |
| 19th & Mission   | 12/30/2005               | 4              |
| 24th & Mission   | 3/23/2007                | 5              |
| 26th & Shotwell  | 4/24/2007                | 6              |
| 26th & Treat   | 12/13/2005               | 7              |
| 3rd & Kirkwood   | 11/21/2005               | 8              |
| 3rd & Newcomb  | 1/25/2007                | 9              |
| Alemany & Ellsworth  | 12/22/2005               | 10             |
| Eddy & Buchanan  | 7/29/2005                | 11             |
| Eddy & Pierce  | 12/31/2005               | 12             |
| Scott & Eddy   | 12/31/2005               | 12             |
| Turk & Scott   | 2/27/2006                | 12             |
| Haight & Webster   | 5/11/2007                | 13             |
| Jones & Ellis  | 3/7/2007                 | 14             |
| Turk & Taylor  | 3/8/2007                 | 14             |
| Middle Pt & W. Pt  | 12/6/2005                | 15             |
| Mission St & Geneva  | 3/16/2007                | 16             |

Locations that are clustered together are those in extremely close proximity that have installation dates within three months of one another.

Our second evaluation strategy discussed in the previous section requires that we define comparison locations for each of the nineteen locations in Table 1. Recall from our preceding discussion that for a given location receiving a CSC we use all locations with an installation date lying outside of the 209-day pre-period and 264-day post-period to fashion a comparison sample. The distribution of the timing in the installation dates is such that the nineteen locations fall naturally within two chronologically distinct groups: those installed in or prior to February 2006 and those installed in or after December 2006. As these bounding dates are more than 264 days apart, the locations receiving Community Safety Cameras during the later period have installation dates that fall outside of the evaluation period for the locations receiving CSCs earlier. Similarly, the installation dates for the early-installation sites occur more than 209 days before the installation date for the later-receiving sites, and thus lie outside the evaluation window for the latter group. Hence, the late-receiving sites serve as the comparison sample for the early-receiving locations, and visa versa. Note that for each location we measure crime trends in the

comparison locations for the time periods corresponding to the installation date of the treated location. Moreover, for areas that have yet to receive a CSC we measure hypothetical distance to the CSC using the location where the CSC eventually will be installed.

| <b>Table 2</b>   |                              |
|--|------------------------------|
| <b>Matched Comparison Clusters for Each of the Nineteen Crime Camera Locations</b> |                              |
| <b>Location</b>  | <b>Comparison Clusters</b>   |
| Telegraph Hill   | 4, 7, 8, 10, 12, 15          |
| 1050 McAllister  | 4, 7, 8, 10, 12, 15          |
| 16th & Mission   | 4, 7, 8, 10, 12, 15          |
| 19th & Mission   | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| 24th & Mission   | 4, 7, 8, 10, 12, 15          |
| 26th & Shotwell  | 4, 7, 8, 10, 12, 15          |
| 26th & Treat   | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| 3rd & Kirkwood   | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| 3rd & Newcomb  | 4, 7, 8, 10, 12, 15          |
| Alemany & Ellsworth  | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Eddy & Buchanan  | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Eddy & Pierce  | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Scott & Eddy   | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Turk & Scott   | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Haight & Webster   | 4, 7, 8, 10, 12, 15          |
| Jones & Ellis  | 4, 7, 8, 10, 12, 15          |
| Turk & Taylor  | 4, 7, 8, 10, 12, 15          |
| Middle Pt & W. Pt  | 1, 2, 3, 5, 6, 9, 13, 14, 16 |
| Mission St & Geneva  | 4, 7, 8, 10, 12, 15          |

The comparison clusters for each site consists of all other locations where the installation date does not lie within the 209 days prior to the installation date or 264 days following the installation date for the treatment site. Site 11 (Eddy & Buchanan) is not included in the comparison samples due to an unusually large decline in crimes 400 to 500 feet away from the camera location, corresponding to the time periods of the camera installations for the late-installation locations.

Table 2 presents the defined comparison clusters that we use for each of the nineteen locations. The one deviation from our rule for choosing the comparison sample is that we do not use the Eddy & Buchanan site in the comparison sample for the late-receiving locations. We dropped this site from the comparison samples due to an unusually large (relative to all other comparison sites) pre-post decline in crime rates 400 to 500 feet from the camera locations observed in almost all of the pre-post time periods defined for the late-receiving sites.

To gauge the quality of the match between our treated sample (those locations receiving cameras during the evaluation period) and our comparison samples (those locations receiving cameras outside of the relevant evaluation period), Table 3 presents comparisons of average daily criminal incidents in the treated sites and the corresponding comparison sites during the pre-installation period by distance from the crime camera locations. Ideally, one would like the pre-treatment means to be as close as possible and the relationship between pre-treatment crime levels and distance from the CSC sites to be relatively similar. Panel A provides property crime levels (measured as the aggregation of burglaries, larceny theft, and motor vehicle theft incidents) while Panel B provides violent crime levels (measured as the aggregation of homicide, robbery, assault, and sexual offense incidents). The pre-treatment comparison of means suggests that crime levels in the treatment and comparison samples are fairly similar, although there are significant differences near the Community Safety Cameras. In the treatment sites, *pre-treatment crime levels* are highest near the cameras, decline as we move away from the cameras, and then increase again as we move even further away for both property and violent crime. We observe similar patterns for the comparison sites. There are no significant differences in pre-treatment average daily crime rates between the treatment and comparison samples for areas 200 to 500 feet from the camera locations. We do, however, observe significantly higher pre-intervention crime rates in the treatment group within 100 feet of the CSCs. This difference is larger and more significant for property crime than for violent crime. To address this particular imbalance in our effect estimates to follow, we will include controls for cluster-specific fixed effects in our adjusted difference-in-difference estimates.



| Table 3  |               |               |                                    |
|--|---------------|---------------|------------------------------------|
| Comparison of Pre-Installation Average Crime Rates At Locations Receiving a New Camera and the Matched Comparison Sample |               |               |                                    |
| Panel A: Property Crime  |               |               |                                    |
| Distance from camera   | Treatment     | Comparison    | Difference, Treatment – Comparison |
| Within 100 feet  | 0.052 (0.004) | 0.040 (0.001) | 0.012 (0.004) <sup>b</sup>         |
| 100 to 200 feet  | 0.025 (0.003) | 0.023 (0.001) | 0.002 (0.003)                      |
| 200 to 300 feet  | 0.023 (0.003) | 0.028 (0.001) | -0.005 (0.003)                     |
| 300 to 400 feet  | 0.073 (0.005) | 0.067 (0.001) | 0.005 (0.005)                      |
| 400 to 500 feet  | 0.060 (0.004) | 0.057 (0.001) | 0.003 (0.005)                      |
| Panel B: Violent Crime   |               |               |                                    |
| Distance from camera   | Treatment     | Comparison    | Difference, Treatment – Comparison |
| Within 100 feet  | 0.061 (0.005) | 0.053 (0.004) | 0.008 (0.004) <sup>c</sup>         |
| 100 to 200 feet  | 0.030 (0.003) | 0.027 (0.001) | 0.003 (0.003)                      |
| 200 to 300 feet  | 0.022 (0.003) | 0.026 (0.001) | -0.004 (0.003)                     |
| 300 to 400 feet  | 0.082 (0.006) | 0.073 (0.001) | 0.009 (0.006)                      |
| 400 to 500 feet  | 0.059 (0.005) | 0.053 (0.002) | 0.006 (0.004)                      |

Standard errors are in parentheses. Averages are based on the 209 days before installation corresponding to the installation dates of the treatment locations.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

## Empirical Results

In this section we present the main empirical findings of our evaluation. We first investigate the deterrent effect of Community Safety Cameras on local property crime rates. We next test for an effect of cameras on the overall violent crime rate and specific types of violent offenses, followed by an analysis of less serious offenses.

### *The Effect of Installing Community Safety Cameras on Local Property Crime Rates*

We begin our analysis by documenting average daily crime levels for the time period preceding CSC installation and the time period following. Here we focus on Part 1 property crime felony offenses. This category consists of burglaries (residential and otherwise), larceny theft, and motor vehicle theft. Recall, our pre-period consists of the 209 days prior to the CSC installation date for all sites while the post-period consists of the 264 days following the CSC installation.

Table 4 presents average daily crime rates for the pre and post-periods by distance from the CSC. Within each distance band, we also tabulate the pre-post change in average daily crimes and perform a test of whether this change is statistically significant. Panel A of the table presents results for all property crimes, Panel B presents results for crime that we have deemed as occurring in a public place

likely to be captured by a CSC, while Panel C presents tabulations for crimes that occur in private places or locations that are unlikely to be captured by a CSC. Beginning with the results for all property crimes, we observe a statistically significant decline (at the 5 percent level of confidence) in the areas within 100 feet of the new Community Safety Cameras. The decline in average daily incidents from 0.052 to 0.040 constitutes a 23 percent decline in property crime levels. Note that we have concluded from our site visits that the view shed of each CSC does not extend beyond 100 feet. Thus, this inner area is the principal area directly treated by a new CSC.

| <b>Table 4</b>   |                                   |                                  |                               |
|--|-----------------------------------|----------------------------------|-------------------------------|
| <b>Average Daily Property Crimes Before and After Camera Installation by Distance from the Camera Location</b> |                                   |                                  |                               |
|  | <b>Average Daily Crime Before</b> | <b>Average Daily Crime After</b> | <b>Change, After – Before</b> |
| <b>Panel A: All Property Crime</b>   |                                   |                                  |                               |
| <b>Within 100 feet</b>   | 0.052 (0.004)                     | 0.040 (0.003)                    | -0.012 (0.005) <sup>b</sup>   |
| <b>100 to 200 feet</b>   | 0.025 (0.003)                     | 0.023 (0.002)                    | -0.002 (0.003)                |
| <b>200 to 300 feet</b>   | 0.023 (0.003)                     | 0.023 (0.002)                    | 0.000 (0.003)                 |
| <b>300 to 400 feet</b>   | 0.073 (0.005)                     | 0.070 (0.005)                    | -0.002 (0.007)                |
| <b>400 to 500 feet</b>   | 0.060 (0.004)                     | 0.061 (0.004)                    | 0.001 (0.006)                 |
| <b>Panel B: Property Crime in Public Places or Where Crime Location is Unknown</b>                             |                                   |                                  |                               |
| <b>Within 100 feet</b>   | 0.044 (0.004)                     | 0.031 (0.003)                    | -0.013 (0.002) <sup>a</sup>   |
| <b>100 to 200 feet</b>   | 0.010 (0.002)                     | 0.011 (0.002)                    | 0.001 (0.002)                 |
| <b>200 to 300 feet</b>   | 0.018 (0.002)                     | 0.016 (0.002)                    | -0.002 (0.003)                |
| <b>300 to 400 feet</b>   | 0.054 (0.004)                     | 0.053 (0.004)                    | -0.001 (0.006)                |
| <b>400 to 500 feet</b>   | 0.043 (0.004)                     | 0.042 (0.003)                    | 0.001 (0.005)                 |
| <b>Panel C: Property Crime in Private Locations or Locations Unlikely to be Covered by a Surveillance</b>      |                                   |                                  |                               |
| <b>Within 100 feet</b>   | 0.007 (0.001)                     | 0.008 (0.001)                    | 0.001 (0.002)                 |
| <b>100 to 200 feet</b>   | 0.015 (0.002)                     | 0.012 (0.002)                    | -0.003 (0.003)                |
| <b>200 to 300 feet</b>   | 0.005 (0.001)                     | 0.008 (0.001)                    | 0.003 (0.002)                 |
| <b>300 to 400 feet</b>   | 0.019 (0.002)                     | 0.018 (0.002)                    | -0.001 (0.003)                |
| <b>400 to 500 feet</b>   | 0.017 (0.002)                     | 0.019 (0.002)                    | 0.002 (0.003)                 |

Standard errors are in parentheses. Averages are based on 209 days before installation and 264 days after installation for each of the sixteen camera location clusters.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

For more distant areas—i.e., the 100-foot concentric bands between 100 and 500 feet from the cameras—there are no measurable pre-post changes in average daily property crimes. While several sites register small declines, all are small relative to the sampling error, rendering these changes statistically indistinguishable from zero.

The results for property crimes occurring in public places are similar, yet somewhat sharper. For the areas within 100 feet of the CSC, we observe a decline in average daily property crimes of 0.013 (approximately 30 percent of the baseline crime rate of 0.044). This change is statistically significant at the 1 percent level of confidence and is measured more precisely than the overall change in property crimes present in Panel A. Again, there are no measurable changes in the areas from 100 to 500 feet from the Community Safety Cameras. The results for property crimes occurring in either private places or places unlikely to be captured by a CSC stand in stark contrast to the results in Panels A and B. Here, we observe no statistically significant changes in any of the areas, near or far. This falsification check provides support for the interpretation of the results in Panels A and B as a true causal impact of the CSCs on local property crime rates.

Table 5 presents difference-in-difference estimates of the change in property crimes within varying distance bands from the Community Safety Cameras in the treated areas relative to our constructed comparison samples. Remember, the difference-in-difference estimator subtracts the change in crime for the comparison locations not receiving a CSC from the change in crime for the treated groups receiving a CSC. The comparison sample serves as a benchmark estimate of what would have happened to crime rates in a given band had the CSCs not been installed. The table presents three sets of estimates: CSC effects using all property crimes, CSC effects using property crimes occurring in public places, and CSC effects using property crimes occurring in places unlikely to be captured by the CSC. Within each set, we present unadjusted difference-in-difference estimates as well as the regression-adjusted estimate that include a complete set of treatment-strata time effects and cluster id fixed effects. Standard errors are tabulated to allow for clustering within comparison strata cluster groups and thus are robust to serial correlation in the crime-time series.

| <b>Table 5</b>   |                                     |  |  |  |  |  |
|--|-------------------------------------|--|--|--|--|--|
| <b>Pre-Post Camera Installation Changes in Average Daily Property Crimes in Areas Receiving New Cameras Relative to Areas that Have Yet to Receive a Camera or That Already Had a Camera</b> |                                     |  |  |  |  |  |
|  | <b>All Property Crime</b>           |  | <b>Property Crime Occurring in Public Places</b> |  | <b>Property Crime Occurring in Private Locations</b> |  |
|  | Unadjusted Difference-in-Difference | Regression-Adjusted Difference-in-Difference | Unadjusted Difference-in-Difference              | Regression-Adjusted Difference-in-Difference | Unadjusted Difference-in-Difference                  | Regression-Adjusted Difference-in-Difference |
| <b>Within 100 feet</b>   | -0.016 (0.009) <sup>c</sup>         | -0.014 (0.007) <sup>c</sup>                  | -0.019 (0.008) <sup>b</sup>                      | -0.018 (0.006) <sup>a</sup>                  | 0.003 (0.003)  | 0.003 (0.003)                                |
| <b>100 to 200 feet</b>   | 0.002 (0.006)                       | 0.004 (0.005)                                | 0.0001 (0.003)                                   | 0.001 (0.003)                                | 0.002 (0.004)  | 0.002 (0.003)                                |
| <b>200 to 300 feet</b>   | 0.004 (0.005)                       | 0.006 (0.004)                                | -0.003 (0.003)                                   | -0.002 (0.003)                               | 0.007 (0.003) <sup>a</sup>                           | 0.007 (0.002) <sup>a</sup>                   |
| <b>300 to 400 feet</b>   | -0.002 (0.005)                      | -0.001 (0.005)                               | -0.004 (0.004)                                   | -0.003 (0.004)                               | 0.002 (0.003)  | 0.002 (0.002)                                |
| <b>400 to 500 feet</b>   | 0.003 (0.006)                       | 0.003 (0.005)                                | 0.000 (0.005)                                    | 0.000 (0.004)                                | 0.003 (0.003)  | 0.003 (0.003)                                |

Standard errors are in parentheses. The standard errors are robust to serial correlation occurring within treatment strata and cluster identification numbers. The unadjusted difference-in-difference estimates subtract the before-after change in crime rates in the comparison sites from the pre-post change in the treatment sites. The regression-adjusted estimates hold constant a complete set of cluster fixed effects and a complete set of interaction terms between variables measuring the month relative to camera installation and treatment strata.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

| <b>Table 6</b>  |                             |                                     |  |   |                                     |  |
|---|-----------------------------|-------------------------------------|--|---|-------------------------------------|--|
| <b>Pre-Post Camera Installation Changes in Specific Property Crime Rates: Absolute Changes, and Unadjusted and Regression-Adjusted Changes Relative to Areas That Have Yet to Receive a Camera or That Already Had a Camera</b> |                             |                                     |  |   |                                     |  |
|   | <b>All Crime</b>            |                                     |  | <b>Crime Occurring in Public Places</b> |                                     |  |
|   | Absolute Change             | Unadjusted Difference-in-Difference | Regression-Adjusted Difference-in-Difference | Absolute Change                         | Unadjusted Difference-in-Difference | Regression-Adjusted Difference-in-Difference |
| <b>Panel A: Larceny Theft</b>   |                             |                                     |  |   |                                     |  |
| <b>Within 100 feet</b>  | -0.010 (0.004) <sup>b</sup> | -0.016 (0.007) <sup>b</sup>         | -0.015 (0.006) <sup>b</sup>                  | -0.011 (0.004) <sup>a</sup>             | -0.016 (0.006) <sup>a</sup>         | -0.016 (0.006) <sup>a</sup>                  |
| <b>100 to 200 feet</b>  | -0.002 (0.003)              | -0.002 (0.003)                      | -0.002 (0.003)                               | -0.001 (0.002)                          | -0.001 (0.002)                      | -0.001 (0.002)                               |
| <b>200 to 300 feet</b>  | -0.002 (0.003)              | -0.005 (0.003)                      | -0.005 (0.003)                               | -0.002 (0.002)                          | -0.006 (0.003) <sup>b</sup>         | -0.005 (0.003) <sup>b</sup>                  |
| <b>300 to 400 feet</b>  | -0.004 (0.003)              | -0.007 (0.004) <sup>c</sup>         | -0.007 (0.004) <sup>c</sup>                  | -0.006 (0.005)                          | -0.011 (0.004) <sup>b</sup>         | -0.010 (0.004) <sup>b</sup>                  |
| <b>400 to 500 feet</b>  | -0.003 (0.005)              | 0.007 (0.006)                       | 0.007 (0.005)                                | -0.001 (0.004)                          | 0.003 (0.004)                       | 0.004 (0.004)                                |
| <b>Panel B: Burglary</b>  |                             |                                     |  |   |                                     |  |
| <b>Within 100 feet</b>  | -0.000 (0.001)              | 0.002 (0.002)                       | 0.003 (0.002)                                | -0.0001 (0.0004)                        | 0.0001 (0.0004)                     | 0.0001 (0.0004)                              |
| <b>100 to 200 feet</b>  | -0.001 (0.001)              | 0.005 (0.003) <sup>c</sup>          | 0.005 (0.002) <sup>c</sup>                   | 0.0012 (0.0006)                         | 0.0017 (0.0008) <sup>b</sup>        | 0.0018 (0.0007) <sup>b</sup>                 |
| <b>200 to 300 feet</b>  | 0.003 (0.002)               | 0.007 (0.003) <sup>a</sup>          | 0.007 (0.002) <sup>a</sup>                   | 0.0003 (0.0008)                         | -0.0001 (0.0010)                    | -0.0000 (0.0009)                             |
| <b>300 to 400 feet</b>  | -0.004 (0.002)              | -0.003 (0.004)                      | -0.003(0.003)                                | -0.0004 (0.0009)                        | -0.0009 (0.0007)                    | -0.0011 (0.0006) <sup>c</sup>                |
| <b>400 to 500 feet</b>  | -0.002 (0.003)              | -0.003 (0.003)                      | -0.002 (0.003)                               | -0.0002 (0.0010)                        | -0.0008 (0.0009)                    | -0.0007 (0.0008)                             |
| <b>Panel C: Motor Vehicle Theft</b>   |                             |                                     |  |   |                                     |  |
| <b>Within 100 feet</b>  | -0.002 (0.002)              | -0.002 (0.003)                      | -0.002 (0.003)                               | -0.002 (0.002)                          | -0.002 (0.003)                      | -0.002 (0.003)                               |
| <b>100 to 200 feet</b>  | 0.000 (0.001)               | 0.001 (0.002)                       | 0.001 (0.002)                                | 0.000 (0.001)                           | 0.001 (0.002)                       | 0.001 (0.002)                                |
| <b>200 to 300 feet</b>  | -0.001 (0.002)              | 0.002 (0.002)                       | 0.003 (0.002)                                | -0.001 (0.002)                          | 0.003 (0.002)                       | 0.003 (0.002)                                |
| <b>300 to 400 feet</b>  | 0.005 (0.003) <sup>c</sup>  | 0.010 (0.003) <sup>a</sup>          | 0.010 (0.030) <sup>a</sup>                   | 0.005 (0.003) <sup>c</sup>              | 0.009 (0.003) <sup>a</sup>          | 0.009 (0.003) <sup>a</sup>                   |
| <b>400 to 500 feet</b>  | 0.001 (0.002)               | 0.004 (0.002) <sup>b</sup>          | 0.004 (0.002) <sup>c</sup>                   | 0.001 (0.002)                           | 0.005 (0.002) <sup>b</sup>          | 0.004 (0.002) <sup>c</sup>                   |

Standard errors are in parentheses. The standard errors are robust to serial correlation occurring within treatment strata and cluster identification numbers. The unadjusted difference-in-difference estimates subtract the before-after change in crime rates in the comparison sites from the before-after change in the treatment sites. The regression-adjusted estimates hold constant a complete set of cluster fixed effects and a complete set of interaction terms between variables measuring the month relative to camera installation and treatment strata.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

The difference-in-difference estimates in Table 5 basically parallel the single difference results in Table 4. Property crime declines near the Community Safety Cameras in areas receiving new CSCs relative to areas in the comparison sample not receiving CSCs during the corresponding time period. For all property crimes and property crimes defined as occurring in public places, these relative changes are statistically significant, comparable in magnitude to the absolute changes in Table 4, and insensitive to adding controls for time trends and cluster groups. Again, we observe no declines nearby for crimes occurring in areas unlikely to be captured by a CSC.

Finally, Table 6 presents a streamlined set of estimation results for the individual property crimes that constitute the overall property crime measure. For each crime, the table presents the absolute pre-post change in crime by distance from the CSC, the unadjusted relative change, and the regression-adjusted change relative to the comparison sample. The table also provides results for two different aggregate measures of each crime: all crimes in the category and crimes occurring in public places. The results in Table 6 show that the decline in overall property crime is being driven by a decline in larceny theft. Within this subcategory, roughly half of the crimes are classified as a theft from a vehicle, with the remaining half attributable to theft from a building (12.4 percent), shoplifting (4.8 percent), pocket-picking (4.0 percent) theft of vehicle parts (1.5 percent), purse snatching (0.9 percent), and a residual category labels all other larceny (25.5 percent). We find little evidence of an impact of the Community Safety Cameras on burglary or motor vehicle theft.

### *Violent Crime*

Tables 7 through 9 present corresponding estimation results for overall violent crime (Tables 7 and 8) and for specific violent crimes (Table 9). Beginning with the basic pre-post patterns in Table 7, there is little evidence that the installation of Community Safety Cameras impacted the average number of violent crimes in any of the five distance groups. The results for all violent crime indicate slight increases in violent crime that are all statistically indistinguishable from zero and that exhibit no discernable pattern with regard to distance from the CSC location. We find similar results when we look at violent crimes occurring in public places as well as violent crimes occurring in private places or other places unlikely to be captured by the CSC.

| <b>Table 7</b>  |                                   |                                  |                               |
|---|-----------------------------------|----------------------------------|-------------------------------|
| <b>Average Daily Violent Crimes Before and After Camera Installation by Distance from the Camera Location</b>   |                                   |                                  |                               |
|   | <b>Average Daily Crime Before</b> | <b>Average Daily Crime After</b> | <b>Change, After – Before</b> |
| <b>Panel A: All Violent Crime</b>   |                                   |                                  |                               |
| <b>Within 100 feet</b>  | 0.061 (0.005)                     | 0.065 (0.004)                    | 0.004 (0.006)                 |
| <b>100 to 200 feet</b>  | 0.030 (0.003)                     | 0.038 (0.003)                    | 0.008 (0.005)                 |
| <b>200 to 300 feet</b>  | 0.022 (0.003)                     | 0.023 (0.002)                    | 0.001 (0.003)                 |
| <b>300 to 400 feet</b>  | 0.082 (0.006)                     | 0.083 (0.008)                    | 0.001 (0.008)                 |
| <b>400 to 500 feet</b>  | 0.059 (0.005)                     | 0.063 (0.003)                    | 0.004 (0.006)                 |
| <b>Panel B: Violent Crime in Public Places or Where Crime Location is Unknown</b>                               |                                   |                                  |                               |
| <b>Within 100 feet</b>  | 0.054 (0.004)                     | 0.054 (0.004)                    | 0.000 (0.006)                 |
| <b>100 to 200 feet</b>  | 0.018 (0.002)                     | 0.023 (0.003)                    | 0.006 (0.004)                 |
| <b>200 to 300 feet</b>  | 0.016 (0.002)                     | 0.015 (0.002)                    | -0.001 (0.003)                |
| <b>300 to 400 feet</b>  | 0.058 (0.005)                     | 0.056 (0.004)                    | -0.002 (0.006)                |
| <b>400 to 500 feet</b>  | 0.040 (0.004)                     | 0.042 (0.003)                    | 0.002 (0.005)                 |
| <b>Panel C: Violent Crime in Private Locations or Locations Unlikely to be Covered by a Surveillance Camera</b> |                                   |                                  |                               |
| <b>Within 100 feet</b>  | 0.007 (0.001)                     | 0.010 (0.002)                    | 0.002 (0.002)                 |
| <b>100 to 200 feet</b>  | 0.012 (0.002)                     | 0.014 (0.002)                    | 0.002 (0.002)                 |
| <b>200 to 300 feet</b>  | 0.007 (0.001)                     | 0.008 (0.001)                    | 0.001 (0.002)                 |
| <b>300 to 400 feet</b>  | 0.024 (0.003)                     | 0.026 (0.003)                    | 0.002 (0.004)                 |
| <b>400 to 500 feet</b>  | 0.019 (0.002)                     | 0.021 (0.002)                    | 0.002 (0.003)                 |

Standard errors are in parentheses. Averages are based on 209 days before installation and 264 days after installation for each of the sixteen camera location clusters.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

Table 8 presents estimates of changes in violent crime for our 100-foot concentric bands in the areas receiving Community Safety Cameras relative to the comparison areas that do not receive CSCs during the corresponding time period. Again, there is no evidence of a relative decline in violent crime near the CSCs in any of the results in the table. Moreover, nearly all of the relative pre-post changes in violent crime are statistically insignificant (with the exception of the relative decline in violent crime 300 to 400 feet away from the CSCs for the crimes occurring in public places). Thus, the lack of an absolute pre-post installation decline in areas near the CSCs, the finding of no differences in the changes in crime in areas near relative to areas far from the CSCs, and the lack of a relative change in crime in the treated relative to the comparison sample all suggest that the CSCs have had no impact on violent crime rates in receiving neighborhoods.

Table 9 presents estimates of the absolute and relative changes in crime for the four felony offenses that comprise the aggregate violent crime index (assault, homicide, robbery, and forcible sex offenses). For three of the specific offenses (assault, robbery, and forcible sex offenses) there is no evidence of decline near the Community Safety Cameras or of an increase in crime in areas outside of the cameras' views. This is the case for both the absolute pre-post changes in crime, the unadjusted difference-in-difference tabulations of the changes in relative daily crimes, as well as for the regression-adjusted

relative difference estimates. Moreover, there is no difference between the results for all crime and crimes occurring in public places.

### *Homicide*

Homicide rates, at first glance, appear to exhibit a pattern consistent with a local deterrent effect in the areas near the CSC and the displacement of violent crime to areas further away. Examining all homicides regardless of location reveals a decline in average daily homicides in the area within 100 feet of the Community Safety Cameras that is almost statistically significant at the 10 percent level of confidence (the probability value on the absolute change of -0.0006 is 0.1113). In addition, there is a statistically significant increase in homicides of 0.0012 (significant at the 5 percent level of confidence) in the regions 400 to 500 feet away from the camera. While these results differ somewhat in the estimated changes relative to the comparison areas as well as when we restrict the dependent variable to homicides occurring in areas likely to be captured by the camera, the flavor of the results is roughly the same.

Since we find little evidence of a displacement effect for all other crimes analyzed, we decided to dig further into these homicide patterns to assess whether the cameras are driving the patterns we see in Table 9. We requested from the SFPD the incident report for each homicide occurring within 500 feet of one of cameras during our specified pre- and post-periods. Of the twenty homicides that meet these criteria, the SFPD was able to locate all but one of the reports.<sup>90</sup> Each report contained a series of summary sheets describing the date and time of the incident as well as information on victims, suspects if any, and eyewitnesses if any as well as a narrative written by at least one (but sometimes more than one) of the officers who initially arrived on the scene. While most of the information on victims and eyewitnesses was redacted from the reports, the summary sheets as well as the officers' narratives provide valuable information on the circumstances surrounding each homicide that aid in interpreting the homicide patterns presented in Table 9.

Table 10 presents a summary of the information that we gleaned from reading each homicide report. For each homicide, the table presents an incident number,<sup>91</sup> an indicator of whether the crime occurred within 250 feet of the CSC, information on whether the crime occurred before or after the installation of a CSC, a description of the location, a victim number for each incident (ranging from one to two), the victim's gender and age when available, and a summary of the circumstances of the crime as presented

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<sup>90</sup> There was an error in the recording of the incident number and thus this report was not able to be located.

<sup>91</sup> We created our own incident numbers to maintain confidentiality.



in report narratives, constructed mostly from eyewitness reports. All of the homicides were committed with a firearm. Three incidents had two homicide victims each while the remaining incidents were single-victim homicides. All of the homicides occurred in a public place, such as a street, sidewalk, or alley, with the exception of two that occurred in more distant regions after the cameras were installed. The first (incident number 10) occurred in the stairwell of an apartment building, out of the Community Safety Cameras' view owing to distance and the location within a building. The second also occurred in the more distant areas (250 to 500 feet away) and inside a building (the victim was shot inside a restaurant).

The detail in the actual homicide reports suggests several problems with our initial homicide calculation in Table 9. First, one might argue that the proper unit of analysis for analyzing a CSC's deterrent effect should be the number of incidents rather than the number of victims. As there are three incidents with multiple victims, moving from victims to incidents as the unit of analysis will alter the before and after homicide levels as well as the calculated changes in average daily crime rates.

The second problem concerns the fact that two of the homicides occurred in private locations well out of the CSCs' view range. For these crimes (one of which was most likely premeditated, based on the report's narrative), a camera on the street would be unlikely to deter the assailant, and thus should be dropped from the analysis.

| <b>Table 8</b>  |                                     |  |   |  |   |  |
|---|-------------------------------------|--|---|--|---|--|
| <b>Pre-Post Camera Installation Changes in Average Daily Violent Crimes in Areas Receiving New Cameras Relative to Areas that Have Yet to Receive a Camera or That Already Had a Camera</b> |                                     |  |   |  |   |  |
|   | <b>All Property Crime</b>           |  | <b>Violent Crime Occurring in Public Places</b> |  | <b>Violent Crime Occurring in Private Locations</b> |  |
|   | Unadjusted Difference-in-Difference | Regression-Adjusted Difference-in-Difference | Unadjusted Difference-in-Difference             | Regression-Adjusted Difference-in-Difference | Unadjusted Difference-in-Difference                 | Regression-Adjusted Difference-in-Difference |
| <b>Within 100 feet</b>  | -0.007 (0.009)                      | -0.005 (0.008)                               | -0.009 (0.009)                                  | -0.007 (0.007)                               | 0.002 (0.002)                                       | 0.002 (0.002)                                |
| <b>100 to 200 feet</b>  | 0.005 (0.008)                       | 0.005 (0.007)                                | 0.002 (0.005)                                   | 0.003 (0.005)                                | 0.002 (0.003)                                       | 0.002 (0.003)                                |
| <b>200 to 300 feet</b>  | 0.006 (0.005)                       | 0.005 (0.004)                                | 0.004 (0.003)                                   | 0.0003 (0.002)                               | 0.002 (0.003)                                       | 0.002 (0.002)                                |
| <b>300 to 400 feet</b>  | -0.008 (0.005)                      | -0.008 (0.005)                               | -0.008 (0.004) <sup>c</sup>                     | -0.008 (0.004) <sup>b</sup>                  | 0.001 (0.003)                                       | 0.000 (0.003)                                |
| <b>400 to 500 feet</b>  | -0.005 (0.007)                      | -0.004 (0.007)                               | -0.006 (0.006)                                  | -0.005 (0.005)                               | 0.001 (0.002)                                       | 0.001 (0.002)                                |

Standard errors are in parentheses. The standard errors are robust to serial correlation occurring within treatment strata and cluster identification numbers. The unadjusted difference-in-difference estimates subtract the before-after change in crime rates in the comparison sites from the before-after change in the treatment sites. The regression-adjusted estimates hold constant a complete set of cluster fixed effects and a complete set of interaction terms between variables measuring the month relative to camera installation and treatment strata.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

| <b>Table 9</b>   |                              |  |   |   |  |   |
|--|------------------------------|--|---|---|--|---|
| <b>Pre-Post Camera Installation Changes in Specific Violent Crime Rates: Absolute Changes, and Unadjusted and Regression-Adjusted Changes Relative to Areas That Have Yet to Receive a Camera or That Already Had a Camera</b> |                              |  |   |   |  |   |
|  | <b>All Crime</b>             |  |   | <b>Crime Occurring in Public Places</b> |  |   |
|  | <b>Absolute Change</b>       | <b>Unadjusted Difference-in-Difference</b> | <b>Regression-Adjusted Difference-in-Difference</b> | <b>Absolute Change</b>                  | <b>Unadjusted Difference-in-Difference</b> | <b>Regression-Adjusted Difference-in-Difference</b> |
| <b>Panel A: Assault</b>  |                              |  |   |   |  |   |
| <b>Within 100 feet</b>   | 0.002 (0.005)                | -0.004 (0.006)                             | -0.003 (0.006)                                      | -0.001 (0.004)                          | -0.007 (0.006)                             | -0.006 (0.006)                                      |
| <b>100 to 200 feet</b>   | 0.007 (0.004) <sup>c</sup>   | 0.007 (0.007)                              | 0.007 (0.007)                                       | 0.004 (0.003)                           | 0.004 (0.005)                              | 0.004 (0.005)                                       |
| <b>200 to 300 feet</b>   | 0.001 (0.003)                | 0.005 (0.004)                              | 0.005 (0.005)                                       | -0.001 (0.002)                          | 0.002 (0.004)                              | 0.002 (0.003)                                       |
| <b>300 to 400 feet</b>   | 0.000 (0.007)                | -0.003 (0.005)                             | -0.004 (0.005)                                      | -0.002 (0.005)                          | -0.003 (0.003)                             | -0.003 (0.003)                                      |
| <b>400 to 500 feet</b>   | 0.002 (0.005)                | -0.002 (0.006)                             | -0.002 (0.005)                                      | 0.000 (0.004)                           | -0.004 (0.004)                             | -0.003 (0.003)                                      |
| <b>Panel B: Homicide</b>   |                              |  |   |   |  |   |
| <b>Within 100 feet</b>   | -0.0006 (0.0004)             | -0.0010 (0.0004) <sup>b</sup>              | -0.0009 (0.0004) <sup>b</sup>                       | -0.0003 (0.0002)                        | -0.0007 (0.0003) <sup>b</sup>              | -0.0006 (0.0003) <sup>b</sup>                       |
| <b>100 to 200 feet</b>   | -0.0004 (0.0008)             | -0.0002 (0.0008)                           | -0.0001 (0.0007)                                    | 0.0002 (0.0005)                         | 0.0004 (0.0006)                            | 0.0005 (0.0006)                                     |
| <b>200 to 300 feet</b>   | -0.0006 (0.0005)             | -0.0008 (0.0006)                           | -0.0009 (0.0005)                                    | -0.0006 (0.0005)                        | -0.0006 (0.0006)                           | -0.0006 (0.0005)                                    |
| <b>300 to 400 feet</b>   | 0.0003 (0.0006)              | 0.0001 (0.0007)                            | 0.0001 (0.0009)                                     | 0.0006 (0.0005)                         | 0.0004 (0.0006)                            | 0.0004 (0.0005)                                     |
| <b>400 to 500 feet</b>   | 0.0012 (0.0006) <sup>b</sup> | 0.0006 (0.0006)                            | 0.0004 (0.0006)                                     | 0.0009 (0.0005) <sup>c</sup>            | 0.0010 (0.0004) <sup>b</sup>               | 0.0009 (0.0004) <sup>b</sup>                        |
| <b>Panel C: Robbery</b>  |                              |  |   |   |  |   |
| <b>Within 100 feet</b>   | 0.003 (0.003)                | -0.002 (0.003)                             | -0.002 (0.003)                                      | 0.003 (0.003)                           | -0.001 (0.003)                             | -0.001 (0.003)                                      |
| <b>100 to 200 feet</b>   | 0.001 (0.002)                | -0.001 (0.002)                             | -0.001 (0.002)                                      | 0.001 (0.002)                           | -0.001 (0.001)                             | -0.001 (0.001)                                      |
| <b>200 to 300 feet</b>   | 0.000 (0.001)                | 0.002 (0.001)                              | 0.001 (0.001)                                       | 0.001 (0.001)                           | 0.002 (0.002)                              | 0.001 (0.002)                                       |
| <b>300 to 400 feet</b>   | 0.001 (0.004)                | -0.005 (0.002) <sup>b</sup>                | -0.004 (0.002) <sup>b</sup>                         | -0.001 (0.003)                          | -0.007 (0.002) <sup>a</sup>                | -0.006 (0.002) <sup>a</sup>                         |
| <b>400 to 500 feet</b>   | 0.001 (0.002)                | -0.005 (0.002) <sup>b</sup>                | -0.004 (0.002) <sup>b</sup>                         | 0.001 (0.003)                           | -0.004 (0.002) <sup>c</sup>                | -0.003 (0.002) <sup>c</sup>                         |
| <b>Panel D: Sex Offenses</b>   |                              |  |   |   |  |   |
| <b>Within 100 feet</b>   | -0.0003 (0.0008)             | 0.0002 (0.0009)                            | 0.0000 (0.0009)                                     | -0.0007 (0.0007)                        | -0.0000 (0.0006)                           | -0.0002 (0.0006)                                    |
| <b>100 to 200 feet</b>   | 0.0001 (0.0006)              | -0.0005 (0.0008)                           | -0.0003 (0.0006)                                    | -0.0003 (0.0003)                        | -0.0002 (0.0003)                           | -0.0001 (0.0003)                                    |
| <b>200 to 300 feet</b>   | 0.0001 (0.0006)              | 0.0001 (0.0006)                            | 0.0002 (0.0006)                                     | 0.0003 (0.0003)                         | 0.0005 (0.0003) <sup>c</sup>               | 0.0006 (0.0003) <sup>c</sup>                        |
| <b>300 to 400 feet</b>   | 0.0000 (0.0008)              | 0.0006 (0.0008)                            | 0.0008 (0.0009)                                     | 0.0004 (0.0005)                         | 0.0007 (0.0006)                            | 0.0008 (0.0006)                                     |
| <b>400 to 500 feet</b>   | 0.0004 (0.0009)              | 0.0002 (0.0009)                            | 0.0013 (0.0009)                                     | -0.0002 (0.0007)                        | 0.0007 (0.0006)                            | 0.0005 (0.0006)                                     |

Standard errors are in parentheses. The standard errors are robust to serial correlation occurring within treatment strata and cluster identification numbers. The unadjusted difference-in-difference estimates subtract the before-after change in crime rates in the comparison sites from the before-after change in the treatment sites. The regression-adjusted estimates hold constant a complete set of cluster fixed effects and a complete set of interaction terms between variables measuring the month relative to camera installation and treatment strata.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

| Table 10   |  |                                     |                        |               |               |            |  |
|--|--|-------------------------------------|------------------------|---------------|---------------|------------|--|
| Details on Each Homicide Occurring Within 500 Feet of the Camera During the Study Period |  |                                     |                        |               |               |            |  |
| Incident number  | Within 250 feet of camera <sup>a</sup> | Before or after camera installation | Incident Location      | Victim Number | Victim Gender | Victim Age | Contextual information from Officer's narrative  |
| 1  | No                                     | Before                              | Fired into stopped car | 1             | Male          | 27         | Car with several passengers was stopped while the victim (in the front passenger seat) was talking to someone on the street. Assailant walked up to the car and shot the victim at closer range. |
| 2  | No                                     | Before                              | Sidewalk               | 1             | Male          | NA         | Suspect emerged from an alley and shot the victim in the back.   |
| 3  | No                                     | After                               | Sidewalk               | 1             | Male          | NA         | No eyewitness detail   |
| 4  | No                                     | After                               | Sidewalk               | 1             | Male          | NA         | Victim shot by an assailant in an auto that then sped off  |
| 5  | No                                     | After                               | Sidewalk               | 1             | Male          | 17         | According to eyewitness, victim shot by a suspect with whom the victim was standing moments before the   |
| 6  | No                                     | After                               | Alley                  | 1             | Male          | NA         | No eyewitness detail   |
| 7  | No                                     | After                               | Alley/street           | 1             | Male          | 36         | No eyewitness detail   |
| 8  | No                                     | After                               | Street                 | 1             | Male          | NA         | Eyewitness identified suspect as an acquaintance of the victim with whom the victim had a prior argument   |
| 9  | No                                     | After                               | Parking lot            | 1             | Male          | 27         | No eyewitness detail   |
| 10   | No                                     | After                               | Apartment              | 1             | Male          | 24         | Victim shot in an apartment building stairwell   |
| 11   | No                                     | After                               | Inside a restaurant    | 1             | Male          | 27         | Victim shot in the back of the head by an assailant who entered the establishment wearing a ski mask   |
| 12 <sup>b</sup>  | Yes                                    | Before                              | Unknown                | 1             | NA            | NA         | No information available   |
| 13   | Yes                                    | Before                              | Street                 | 1             | Male          | NA         | Assailants shot victim from a slow moving car  |
| 14   | Yes                                    | Before                              | Street                 | 1             | Male          | NA         | Some suggestion of drug activity (narcotics found on the scene)  |
| 15   | Yes                                    | Before                              | Sidewalk               | 1             | NA            | NA         | Shooting followed an argument. Suspects sped off in a car  |
| 15   | Yes                                    | Before                              | Sidewalk               | 2             | NA            | NA         | Shooting followed an argument. Suspects sped off in a car  |
| 16   | Yes                                    | Before                              | Parking lot            | 1             | Male          | NA         | Homicides preceded by seven men arguing in a parking lot   |
| 16   | Yes                                    | Before                              | Parking lot            | 2             | Male          | NA         | Homicides preceded by seven men arguing in a parking lot   |
| 17   | Yes                                    | After                               | Sidewalk               | 1             | NA            | NA         | No eyewitness detail   |
| 17   | Yes                                    | After                               | Sidewalk               | 2             | NA            | NA         | No eyewitness detail   |

Information in this table was gleaned from police incident reports for all homicides occurring within 500 feet of a camera during the 209 days pre-period and the 264 days post-period.

a. Incidents not within 250 feet occurred from 250 to 500 feet from the camera.

b. The police report for this incident could not be located. In the main data extract provided to us, the location field was marked unknown

Table 11 shows the effect of adjusting the data in this manner on the counts of homicide victims/incidents occurring within 250 feet and 250 to 500 feet of the camera. Panel A presents base totals for all homicides, excluding multiple-incident homicides or homicides in private places (these are the incidents behind the daily average rates in Table 9). Panel A shows that within 250 feet of the CSC homicides declined from seven pre-CSC to two post-CSC. In the more distant region, homicides increase from two to nine. Panel B uses incidents as the unit of analysis rather than the number of homicide victims (effectively counting each homicide incident as one occurrence regardless of the number of victims).

| <b>Table 11</b>   |               |              |                             |
|---|---------------|--------------|-----------------------------|
| <b>Before-After Counts of All Homicides, Homicide Incidents (Accounting for Multiple Victims), and Homicide Incidents Occurring in Public Places in Areas Within 500 Feet of a Camera</b> |               |              |                             |
| <b>Panel A: All Homicides</b>   |               |              |                             |
|   | <b>Before</b> | <b>After</b> | <b>Change, After-Before</b> |
| <b>Within 250 feet</b>  | 7             | 2            | -5                          |
| <b>250 to 500 feet</b>  | 2             | 9            | 7                           |
| <b>Panel B: Homicide Incidents</b>  |               |              |                             |
|   | <b>Before</b> | <b>After</b> | <b>Change, After-Before</b> |
| <b>Within 250 feet</b>  | 5             | 1            | -4                          |
| <b>250 to 500 feet</b>  | 2             | 9            | 7                           |
| <b>Panel C: Homicide Incidents Occurring in Public Places</b>   |               |              |                             |
|   | <b>Before</b> | <b>After</b> | <b>Change, After-Before</b> |
| <b>Within 250 feet</b>  | 5             | 1            | -4                          |
| <b>250 to 500 feet</b>  | 2             | 7            | 5                           |

Totals based on information gleaned from the actual SFPD incident reports.

Here we see a smaller decline near the Community Safety Cameras (a decline of four relative to a decline of five when we use all homicides) and a similar seven-incident increase in the more distant area. Panel C uses incidents as the unit of analysis and drops the two homicides that occurred in private places from the analysis. Here, the homicide totals near the CSCs do not change, but the increase in homicides in the more distance region is smaller by two.

**Table 12**  
**Estimated Before-After Changes in Average Daily Homicides Limiting Counts to Independent Incidents (Accounting for Multiple Victim Homicides) and Dropping Homicides Occurring in Private Places**

|                        | Absolute Change, All Homicides, Unit of Observation Equals Homicide Victims | Absolute Change, All Homicides, Unit of Observation is Independent Incidents | Absolute Change, Homicides Occurring in Public, Unit of Observation is Independent Incidents |
|------------------------|---|--|--|
| <b>Within 100 feet</b> | -0.0006 (0.0004)  | -0.0006 (0.0004)   | -0.0006 (0.0004)   |
| <b>100 to 200 feet</b> | -0.0004 (0.0008)  | -0.0004 (0.0008)   | -0.0004 (0.0005)   |
| <b>200 to 300 feet</b> | -0.0006 (0.0005)  | -0.0006 (0.0005)   | -0.0003 (0.0003)   |
| <b>300 to 400 feet</b> | 0.0003 (0.0006)   | 0.0003 (0.0007)  | 0.0003 (0.0007)  |
| <b>400 to 500 feet</b> | 0.0012 (0.0006) <sup>b</sup>  | 0.0012 (0.0006) <sup>b</sup>   | 0.0007 (0.0005)  |

Standard errors are in parentheses. Change calculations where the incident is the unit of observations count each incident as one occurrence regardless of the number of homicide victims. Absolute change calculations for homicides occurring in public drop two homicides, one that occurred in an apartment building and the other in a restaurant.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

To see the impact of these adjustments on our estimates of the changes in average daily crime rates, Table 12 presents estimates of the absolute pre-post change in homicide rates within 100-foot concentric bands of the Community Safety Cameras after making the two adjustments presented in Table 11. The table also presents the results from formal hypothesis tests of whether each calculated change is statistically distinguishable from zero. The tabulations in the first column are reproduced from the corresponding estimates presented in Table 9 for reference. The second set of estimates uses incidents as the unit of analysis (as in Panel B in Table 11), while the third column of estimates is based on incidents and drops the two homicides that occurred in public places. Accounting for multiple incidents does not alter the finding of a near significant decrease in homicides near the Community Safety Cameras and a statistically significant increase in the areas further away. Dropping the two homicides in private places, however, does alter this pattern. Both homicides occurred in the areas 400 to 500 feet from a CSC. When disregarded, the increase in homicide in this region is smaller and statistically insignificant (as are all of the other changes in average daily homicides). Hence, based on this finding, we conclude that neither the level nor the spatial distribution of homicide is impacted by the Community Safety Cameras.

Any changes we see and their proximity to the cameras are within the range of random variability for this crime.

*Other Criminal Incidents*

Thus far we have focused on the effects of Community Safety Cameras on serious felony offenses. Here, we turn to other criminal incidents that fall outside of the Part 1 felony offenses defined by the FBI. We test for an effect of CSC installations on drugs/narcotics incidents as well as a composite category of incidents equal to the sum of prostitution, vandalism, and incidents labeled as suspicious occurrences. While we performed the full gamut of tests on each set of incidents (we also performed separate analysis for each type of incident making up the second composite category), here we present a limited set of results. The patterns evident in what we present are essentially representative of what we find with more extensive testing.

Table 13 presents absolute pre-post changes in average daily crimes for each of the 100-foot distance bands surrounding the Community Safety Cameras. For the two outcomes, we present estimates for all crimes and crimes occurring in public places. Beginning with drug incidents, there are no significant declines near the CSCs or declines in any of the more distant areas bands. All of the changes presented are statistically insignificant. For the prostitution/vandalism/suspicious occurrences group we observe a slight increase in crime near the cameras and no changes anywhere else. Thus, there is no evidence of an impact of the Community Safety Cameras on these alternative outcomes.

| <b>Table 13</b>   |                        |                                   |  |                                   |
|---|------------------------|-----------------------------------|--|-----------------------------------|
| <b>Before-After Changes in Drugs Incidents and Prostitution, Vandalism, and Suspicious Occurrence Incidents</b> |                        |                                   |  |                                   |
|   | <b>Drugs Incidents</b> |                                   | <b>Prostitution, Vandalism, and Suspicious</b> |                                   |
|   | <b>All Incidents</b>   | <b>Incidents in Public Places</b> | <b>All Incidents</b>                           | <b>Incidents in Public Places</b> |
| <b>Within 100 feet</b>  | 0.001 (0.008)          | 0.003 (0.008)                     | 0.005 (0.003) <sup>c</sup>                     | 0.005 (0.002) <sup>b</sup>        |
| <b>100 to 200 feet</b>  | 0.007 (0.006)          | 0.009 (0.006)                     | 0.005 (0.003) <sup>c</sup>                     | 0.002 (0.002)                     |
| <b>200 to 300 feet</b>  | -0.003 (0.005)         | -0.004 (0.005)                    | 0.001 (0.003)                                  | 0.001 (0.002)                     |
| <b>300 to 400 feet</b>  | 0.006 (0.010)          | 0.009 (0.009)                     | 0.003 (0.004)                                  | 0.001 (0.003)                     |
| <b>400 to 500 feet</b>  | -0.003 (0.007)         | -0.002 (0.007)                    | 0.001 (0.004)                                  | -0.002 (0.002)                    |

Standard errors are in parentheses. The figures provide the unadjusted before-after change in average daily incidents.

- a. Statistically significant at the 1 percent level of confidence.
- b. Statistically significant at the 5 percent level of confidence.
- c. Statistically significant at the 10 percent level of confidence.

## Site-Specific Effects

The results presented thus far have pooled all CSC locations. The statistical benefits one derives from pooling the data is the greater degree of precision afforded by the larger sample size. During our presentation of the preliminary report, we committed to providing a series of site-by-site estimates of the deterrent effects of the Community Safety Cameras. Accordingly, here we present a limited set of estimates of the changes in crime in areas defined by the 100-foot-distance bands from the CSCs. In particular, we present estimates of changes within the five bands for all crimes, for crimes occurring in public places, and for crimes occurring in private places. Table 14 presents estimates for average daily property crime while Table 15 presents estimates for average daily violent crime.

Before discussing the specific results, we must raise an important caveat pertaining to the relative imprecision of these site-specific results. The smaller sample sizes used to compute the site-specific crime changes means that our margin of error is much greater than the margin of error pertaining to our estimates based on the pooled-cameras sample. In fact, the principal advantage of pooling all cameras in our principal analysis is the greater degree of statistical precision that results. The degree of imprecision for these more disaggregate estimates is such that for fifteen of the sixteen CSC clusters, we cannot rule out an impact of each CSC installation on average daily crime rates of the order of magnitude documented for all cameras combined. Stated slightly differently, it will take a particularly large measured decline in crime to register as statistically significant and different from zero. For these reasons, we caution against reading too much into the site-specific estimates. Certainly, in nearly all cases, a statistically insignificant change does not support the conclusion that the cameras have not been as successful at a particular site as they are on average for all nineteen sites.

With this important caveat in mind, we turn to a discussion of the site-specific results. Table 14 presents before-after changes in average daily property crime for each CSC cluster and for each of the five geographic areas that we have been analyzing throughout the report. The first row of estimates reproduces the changes for all CSCs pooled for reference. There are four sites where property crime within 100 feet of the CSC declines by a statistically significant amount (19<sup>th</sup> St and Mission St., 26<sup>th</sup> St. and Treat Ave., Haight St. and Webster St., and the Jones/Ellis cluster). Of these four, we observe significant declines in property crimes in public places for the latter three. Moreover, the changes in crime in the more distant areas (beyond 100 feet) are generally smaller or nonexistent for the latter three



sites, while for 19<sup>th</sup> and Mission Streets there appears to be a general trend toward declining crime throughout the area during the time period surrounding the CSC installation.

Table 15 presents comparable results for violent crime. As we found no impact of the camera installation on violent crime overall, it is not too surprising that there is little evidence of a CSC-violent crime effect at the level of specific sites. There are two sites, however, that experience statistically significant declines in violent crime near the camera locations and no corresponding decreases or increases in the areas further away. At 19<sup>th</sup> and Mission Streets, average daily violent crime occurring in public places declines by 0.038 pre-post CSC installation (a change statistically significant at the 5 percent level of confidence). In addition, overall violent crime as well as crime occurring in public places at the Mission St. and Geneva Ave. location declines by 0.041 and 0.040 respectively (both declines are statistically significant at the 5 percent level of confidence).

| Table 14<br>Site-Specific Estimates of the Change in Property Crimes Occurring in Public Places Pre-Post Camera Installation, Absolute Changes and Change Relative to Areas That Already Had a Camera or Had Yet to Receive a Camera |                               |                             |                             |                             |                             |
|--|-------------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Location   | Distance from camera location |                             |                             |                             |                             |
|  | Within a 100 feet             | 100 to 200 feet             | 200 to 300 feet             | 300 to 400 feet             | 400 to 500 feet             |
| <b>All Cameras Pooled</b>  |                               |                             |                             |                             |                             |
| All Crimes   | -0.012 (0.005) <sup>b</sup>   | -0.002 (0.003)              | 0.000 (0.003)               | -0.002 (0.007)              | 0.001 (0.006)               |
| Crime in public places   | -0.013 (0.002) <sup>a</sup>   | 0.001 (0.002)               | -0.002 (0.003)              | -0.001 (0.006)              | 0.001 (0.005)               |
| Crime in private places  | 0.001 (0.002)                 | -0.003 (0.003)              | 0.003 (0.002)               | -0.001 (0.003)              | 0.002 (0.003)               |
| <b>1 Telegraph Hill</b>  |                               |                             |                             |                             |                             |
| All Crimes   | 0.004 (0.004)                 | -0.017 (0.013)              | 0.021 (0.013)               | 0.011 (0.016)               | 0.002 (0.020)               |
| Crime in public places   | 0.004 (0.004)                 | -0.012 (0.010)              | 0.010 (0.009)               | 0.001 (0.011)               | -0.006 (0.015)              |
| Crime in private places  | 0.000 (0.000)                 | -0.006 (0.007)              | 0.010 (0.009)               | 0.010 (0.009)               | 0.008 (0.013)               |
| <b>1050 McAllister St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | -0.003 (0.010)                | 0.000 (0.000)               | 0.001 (0.011)               | -0.018 (0.018)              | -0.030 (0.017) <sup>c</sup> |
| Crime in public places   | -0.002 (0.008)                | 0.000 (0.000)               | -0.003 (0.010)              | -0.003 (0.016)              | -0.040 (0.017) <sup>b</sup> |
| Crime in private places  | -0.001 (0.006)                | 0.000 (0.000)               | 0.004 (0.004)               | -0.014 (0.007) <sup>c</sup> | 0.004 (0.004)               |
| <b>16<sup>th</sup> St. &amp; Mission St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | 0.034 (0.039)                 | 0.017 (0.018)               | 0.018 (0.030)               | 0.007 (0.023)               | 0.001 (0.021)               |
| Crime in public places   | 0.019 (0.038)                 | 0.008 (0.013)               | 0.012 (0.029)               | 0.000 (0.022)               | -0.002 (0.015)              |
| Crime in private places  | 0.015 (0.008)                 | 0.008 (0.013)               | 0.006 (0.010)               | 0.007 (0.008)               | 0.004 (0.015)               |
| <b>19<sup>th</sup> St. &amp; Mission St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | -0.048 (0.022) <sup>b</sup>   | -0.003 (0.010)              | -0.023 (0.014)              | -0.053 (0.018) <sup>a</sup> | -0.021 (0.017)              |
| Crime in public places   | -0.021 (0.017)                | 0.003 (0.007)               | -0.003 (0.010)              | -0.033 (0.016) <sup>b</sup> | -0.004 (0.012)              |
| Crime in private places  | -0.027 (0.013) <sup>c</sup>   | -0.006 (0.007)              | -0.020 (0.010) <sup>c</sup> | -0.020 (0.010) <sup>c</sup> | -0.017 (0.013)              |
| <b>24<sup>th</sup> St. &amp; Mission St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | -0.022 (0.026)                | -0.002 (0.015)              | -0.011 (0.008)              | -0.000 (0.024)              | 0.029 (0.013)               |
| Crime in public places   | -0.034 (0.022)                | -0.020 (0.010) <sup>c</sup> | -0.006 (0.007)              | -0.012 (0.020)              | 0.019 (0.009) <sup>a</sup>  |
| Crime in private places  | 0.012 (0.013)                 | 0.018 (0.011)               | -0.005 (0.004)              | 0.012 (0.013)               | 0.010 (0.009)               |
| <b>Location</b>  |                               |                             |                             |                             |                             |
| <b>26<sup>th</sup> St. &amp; Shotwell</b>  |                               |                             |                             |                             |                             |
| All Crimes   | 0.015 (0.008)                 | 0.003 (0.007)               | -0.006 (0.007)              | -0.007 (0.019)              | -0.007 (0.015)              |
| Crime in public places   | 0.011 (0.007)                 | 0.003 (0.007)               | -0.006 (0.007)              | -0.015 (0.019)              | -0.017 (0.013)              |
| Crime in private places  | 0.004 (0.004)                 | 0.000 (0.000)               | 0.000 (0.000)               | 0.008 (0.006)               | 0.010 (0.009)               |
| <b>26<sup>th</sup> St. &amp; Treat Ave.</b>  |                               |                             |                             |                             |                             |
| All Crimes   | -0.016 (0.011)                | 0.008 (0.006)               | 0.008 (0.006)               | -0.019 (0.015)              | -0.015 (0.015)              |
| Crime in public places   | -0.024 (0.009) <sup>a</sup>   | 0.000 (0.000)               | 0.004 (0.004)               | -0.017 (0.013)              | -0.001 (0.006)              |
| Crime in private places  | 0.007 (0.006)                 | 0.008 (0.006)               | 0.004 (0.004)               | -0.002 (0.008)              | -0.014 (0.013)              |
| <b>3<sup>rd</sup> St. &amp; Kirkwood Ave.</b>  |                               |                             |                             |                             |                             |
| All Crimes   | -0.007 (0.009)                | -0.029 (0.012)              | 0.023 (0.007)               | 0.004 (0.013)               | 0.024 (0.014)               |
| Crime in public places   | -0.007 (0.009)                | -0.006 (0.007)              | -0.027 (0.013) <sup>c</sup> | -0.003 (0.010)              | 0.018 (0.011)               |
| Crime in private places  | 0.000 (0.000)                 | -0.024 (0.009) <sup>b</sup> | 0.000 (0.000)               | 0.007 (0.008)               | 0.007 (0.008)               |
| <b>3<sup>rd</sup> St. &amp; Newcomb Ave.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | 0.001 (0.011)                 | 0.000 (0.000)               | 0.002 (0.015)               | 0.008 (0.018)               | -0.018 (0.015)              |
| Crime in public places   | -0.003 (0.010)                | 0.000 (0.000)               | 0.009 (0.011)               | 0.013 (0.017)               | -0.013 (0.011)              |
| Crime in private places  | 0.004 (0.004)                 | 0.000 (0.000)               | -0.007 (0.009)              | -0.005 (0.004)              | -0.006 (0.007)              |
| <b>Aleman Blvd. &amp; Ellsworth St.</b>  |                               |                             |                             |                             |                             |
| All Crimes   | 0.018 (0.011)                 | 0.000 (0.000)               | 0.000 (0.000)               | -0.007 (0.011)              | 0.001 (0.016)               |
| Crime in public places   | 0.018 (0.011)                 | 0.000 (0.000)               | 0.000 (0.000)               | -0.001 (0.006)              | 0.008 (0.013)               |
| Crime in private places  | 0.000 (0.000)                 | 0.000 (0.000)               | 0.000 (0.000)               | -0.006 (0.009)              | -0.007 (0.009)              |
| <b>Eddy St. &amp; Buchanan St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | -0.004 (0.012)                | 0.013 (0.012)               | 0.005 (0.013)               | 0.022 (0.016)               | 0.051 (0.033)               |
| Crime in public places   | -0.002 (0.008)                | 0.008 (0.006)               | 0.003 (0.007)               | 0.023 (0.015)               | 0.026 (0.027)               |
| Crime in private places  | -0.002 (0.008)                | 0.006 (0.010)               | 0.002 (0.009)               | -0.001 (0.006)              | 0.025 (0.018)               |
| <b>Eddy St. &amp; Pierce; Scott St. &amp; Eddy St.; Turk St. &amp; Scott St.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | 0.023 (0.021)                 | 0.050 (0.021) <sup>b</sup>  | 0.030 (0.018) <sup>c</sup>  | 0.033 (0.022)               | -0.011 (0.026)              |
| Crime in public places   | -0.002 (0.016)                | 0.037 (0.014) <sup>b</sup>  | 0.006 (0.012)               | 0.023 (0.015)               | -0.011 (0.024)              |
| Crime in private places  | 0.025 (0.013)                 | 0.014 (0.016)               | 0.025 (0.014) <sup>b</sup>  | 0.010 (0.017)               | 0.000 (0.011)               |
| <b>Location</b>  |                               |                             |                             |                             |                             |
| <b>Haight St. &amp; Webster St.</b>  |                               |                             |                             |                             |                             |
| All Crimes   | -0.089 (0.027) <sup>a</sup>   | -0.033 (0.018) <sup>b</sup> | -0.029 (0.011) <sup>b</sup> | -0.025 (0.021)              | -0.018 (0.026)              |
| Crime in public places   | -0.082 (0.027) <sup>a</sup>   | -0.014 (0.015)              | -0.025 (0.011) <sup>b</sup> | -0.014 (0.018)              | -0.027 (0.024)              |
| Crime in private places  | -0.006 (0.007)                | -0.020 (0.010) <sup>c</sup> | -0.005 (0.004)              | -0.012 (0.010)              | 0.009 (0.011)               |
| <b>Jones St. &amp; Ellis St.; Turk St. &amp; Taylor St.</b>  |                               |                             |                             |                             |                             |
| All Crimes   | -0.090 (0.035) <sup>a</sup>   | -0.048 (0.034)              | 0.003 (0.018)               | -0.014 (0.070)              | 0.033 (0.055)               |
| Crime in public places   | -0.079 (0.034) <sup>a</sup>   | -0.011 (0.020)              | -0.016 (0.016)              | -0.004 (0.058)              | 0.029 (0.047)               |
| Crime in private places  | -0.010 (0.014)                | -0.037 (0.028)              | 0.019 (0.009) <sup>b</sup>  | -0.010 (0.036)              | 0.004 (0.027)               |
| <b>Middle Point Rd. &amp; West Pt. Road</b>  |                               |                             |                             |                             |                             |
| All Crimes   | 0.003 (0.007)                 | -0.005 (0.004)              | 0.018 (0.011)               | 0.008 (0.014)               | -0.006 (0.007)              |
| Crime in public places   | 0.007 (0.006)                 | 0.000 (0.000)               | 0.011 (0.007)               | 0.009 (0.013)               | -0.005 (0.004)              |
| Crime in private places  | -0.005 (0.004)                | -0.005 (0.004)              | 0.007 (0.008)               | -0.001 (0.006)              | -0.001 (0.006)              |
| <b>Mission St. &amp; Geneva Ave.</b>   |                               |                             |                             |                             |                             |
| All Crimes   | -0.009 (0.018)                | 0.018 (0.011)               | -0.008 (0.013)              | 0.012 (0.018)               | 0.007 (0.014)               |
| Crime in public places   | -0.008 (0.017)                | 0.019 (0.009) <sup>b</sup>  | -0.008 (0.013)              | 0.013 (0.017)               | 0.009 (0.011)               |
| Crime in private places  | -0.001 (0.006)                | -0.001 (0.006)              | 0.000 (0.000)               | -0.001 (0.006)              | -0.002 (0.008)              |

Standard errors are in parentheses. The absolute changes are the before-after changes for the specified location at the specified distance from the camera. The relative change is the difference in the change in crime rates between the specific site receiving a camera and all other sites that do not contemporaneously receive a camera. Means are based on the 209-day period before installation and 264-day period afterward.

- Statistically significant at the 1 percent level of confidence.
- Statistically significant at the 5 percent level of confidence.
- Statistically significant at the 10 percent level of confidence.

| Table 15<br>Site-Specific Estimates of the Change in Violent Crimes Occurring in Public Places Pre-Post Camera Installation, Absolute Changes and Change Relative to Areas That Already Had a Camera or Had Yet to Receive a Camera |                               |                             |                            |                             |                             |
|---|-------------------------------|-----------------------------|----------------------------|-----------------------------|-----------------------------|
| Location  | Distance from camera location |                             |                            |                             |                             |
|   | Within a 100 feet             | 100 to 200 feet             | 200 to 300 feet            | 300 to 400 feet             | 400 to 500 feet             |
| <b>All Cameras Pooled</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.004 (0.006)                 | 0.008 (0.005)               | 0.001 (0.003)              | 0.001 (0.008)               | 0.004 (0.006)               |
| Crime in public places  | 0.000 (0.006)                 | 0.006 (0.004)               | -0.001 (0.003)             | -0.002 (0.006)              | 0.002 (0.005)               |
| Crime in private places   | 0.002 (0.002)                 | 0.002 (0.002)               | 0.001 (0.002)              | 0.002 (0.004)               | 0.002 (0.003)               |
| <b>1 Telegraph Hill</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.000 (0.000)                 | -0.001 (0.006)              | -0.001 (0.006)             | 0.008 (0.006)               | 0.008 (0.006)               |
| Crime in public places  | 0.000 (0.000)                 | -0.001 (0.006)              | 0.000 (0.000)              | 0.004 (0.004)               | 0.004 (0.004)               |
| Crime in private places   | 0.000 (0.000)                 | 0.000 (0.000)               | -0.001 (0.006)             | 0.004 (0.004)               | 0.004 (0.004)               |
| <b>1050 McAllister St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | 0.002 (0.009)                 | 0.000 (0.000)               | 0.002 (0.009)              | -0.002 (0.016)              | -0.022 (0.013) <sup>c</sup> |
| Crime in public places  | -0.001 (0.006)                | 0.000 (0.000)               | 0.002 (0.009)              | -0.014 (0.015)              | -0.016 (0.011)              |
| Crime in private places   | 0.003 (0.007)                 | 0.000 (0.000)               | 0.000 (0.000)              | 0.011 (0.007)               | -0.006 (0.007)              |
| <b>16<sup>th</sup> St. &amp; Mission St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | -0.020 (0.043)                | 0.006 (0.020)               | -0.020 (0.024)             | 0.009 (0.027)               | -0.058 (0.022) <sup>a</sup> |
| Crime in public places  | -0.027 (0.041)                | 0.001 (0.017)               | 0.015 (0.023)              | -0.005 (0.021)              | -0.043 (0.018) <sup>b</sup> |
| Crime in private places   | 0.008 (0.013)                 | 0.005 (0.012)               | -0.006 (0.007)             | 0.014 (0.017)               | -0.015 (0.015)              |
| <b>19<sup>th</sup> St. &amp; Mission St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | -0.032 (0.021)                | -0.007 (0.009)              | -0.002 (0.015)             | 0.016 (0.014)               | 0.001 (0.016)               |
| Crime in public places  | -0.038 (0.017) <sup>b</sup>   | 0.003 (0.007)               | -0.008 (0.011)             | -0.003 (0.010)              | -0.004 (0.012)              |
| Crime in private places   | 0.006 (0.010)                 | -0.010 (0.006)              | 0.006 (0.010)              | 0.019 (0.009)               | 0.006 (0.010)               |
| <b>24<sup>th</sup> St. &amp; Mission St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | -0.025 (0.034)                | 0.024 (0.022)               | -0.003 (0.010)             | 0.005 (0.016)               | 0.014 (0.010)               |
| Crime in public places  | -0.035 (0.033)                | 0.018 (0.017)               | 0.003 (0.007)              | -0.001 (0.014)              | 0.010 (0.009)               |
| Crime in private places   | 0.011 (0.007)                 | 0.006 (0.015)               | -0.006 (0.007)             | 0.007 (0.008)               | 0.004 (0.004)               |
| <b>Location</b>   |                               |                             |                            |                             |                             |
|   | <b>Within a 100 feet</b>      | <b>100 to 200 feet</b>      | <b>200 to 300 feet</b>     | <b>300 to 400 feet</b>      | <b>400 to 500 feet</b>      |
| <b>26<sup>th</sup> St. &amp; Shotwell</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.006 (0.015)                 | -0.006 (0.007)              | 0.000 (0.000)              | 0.016 (0.014)               | 0.023 (0.015)               |
| Crime in public places  | -0.007 (0.009)                | -0.005 (0.004)              | 0.000 (0.000)              | 0.017 (0.013)               | 0.017 (0.013)               |
| Crime in private places   | 0.013 (0.012)                 | -0.001 (0.006)              | 0.000 (0.000)              | -0.001 (0.006)              | 0.007 (0.008)               |
| <b>26<sup>th</sup> St. &amp; Treat Ave.</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.007 (0.015)                 | -0.006 (0.016)              | -0.011 (0.008)             | -0.012 (0.016)              | -0.002 (0.019)              |
| Crime in public places  | 0.001 (0.011)                 | -0.021 (0.013)              | -0.006 (0.007)             | -0.014 (0.015)              | -0.004 (0.012)              |
| Crime in private places   | 0.007 (0.010)                 | 0.015 (0.008) <sup>c</sup>  | -0.005 (0.004)             | 0.003 (0.007)               | 0.002 (0.015)               |
| <b>3<sup>rd</sup> St. &amp; Kirkwood Ave.</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.002 (0.009)                 | 0.025 (0.016)               | -0.021 (0.018)             | 0.023 (0.015)               | 0.007 (0.008)               |
| Crime in public places  | 0.002 (0.009)                 | 0.022 (0.016)               | -0.020 (0.017)             | 0.022 (0.012) <sup>c</sup>  | 0.004 (0.004)               |
| Crime in private places   | 0.000 (0.000)                 | 0.004 (0.004)               | -0.001 (0.006)             | 0.002 (0.009)               | 0.003 (0.007)               |
| <b>3<sup>rd</sup> St. &amp; Newcomb Ave.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | -0.012 (0.016)                | -0.011 (0.008)              | 0.002 (0.009)              | -0.012 (0.024)              | 0.000 (0.018)               |
| Crime in public places  | -0.011 (0.015)                | -0.014 (0.007) <sup>c</sup> | 0.003 (0.007)              | -0.022 (0.021)              | -0.001 (0.015)              |
| Crime in private places   | -0.001 (0.006)                | 0.004 (0.004)               | -0.001 (0.006)             | 0.009 (0.011)               | 0.002 (0.009)               |
| <b>Alemanly Blvd. &amp; Ellsworth St.</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.018 (0.013)                 | 0.000 (0.000)               | -0.001 (0.006)             | 0.013 (0.012)               | 0.028 (0.015)               |
| Crime in public places  | 0.023 (0.012) <sup>a</sup>    | 0.000 (0.000)               | -0.005 (0.004)             | 0.005 (0.010)               | 0.014 (0.010)               |
| Crime in private places   | -0.005 (0.004)                | 0.000 (0.000)               | 0.004 (0.004)              | 0.008 (0.006)               | 0.014 (0.010)               |
| <b>Eddy St. &amp; Buchanan St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | 0.009 (0.011)                 | -0.009 (0.013)              | 0.005 (0.012)              | 0.007 (0.020)               | 0.016 (0.026)               |
| Crime in public places  | 0.007 (0.008)                 | 0.003 (0.007)               | 0.003 (0.007)              | 0.005 (0.012)               | 0.002 (0.020)               |
| Crime in private places   | 0.003 (0.007)                 | -0.012 (0.010)              | 0.002 (0.009)              | 0.002 (0.015)               | 0.014 (0.017)               |
| <b>Eddy St. &amp; Pierce; Scott St. &amp; Eddy St.; Turk St. &amp; Scott St.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | 0.012 (0.019)                 | -0.016 (0.017)              | 0.005 (0.014)              | 0.009 (0.019)               | 0.016 (0.018)               |
| Crime in public places  | 0.011 (0.016)                 | 0.002 (0.009)               | 0.005 (0.012)              | 0.006 (0.010)               | 0.023 (0.015)               |
| Crime in private places   | 0.001 (0.011)                 | -0.017 (0.013)              | -0.001 (0.006)             | 0.004 (0.013)               | -0.007 (0.009)              |
| <b>Location</b>   |                               |                             |                            |                             |                             |
|   | <b>Within a 100 feet</b>      | <b>100 to 200 feet</b>      | <b>200 to 300 feet</b>     | <b>300 to 400 feet</b>      | <b>400 to 500 feet</b>      |
| <b>Haight St. &amp; Webster St.</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.003 (0.015)                 | -0.006 (0.009)              | 0.002 (0.009)              | -0.004 (0.012)              | -0.018 (0.022)              |
| Crime in public places  | 0.008 (0.014)                 | 0.004 (0.004)               | 0.007 (0.008)              | 0.007 (0.008)               | -0.024 (0.021)              |
| Crime in private places   | -0.005 (0.004)                | -0.010 (0.009)              | -0.005 (0.004)             | -0.011 (0.008)              | 0.007 (0.008)               |
| <b>Jones St. &amp; Ellis St.; Turk St. &amp; Taylor St.</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.121 (0.057) <sup>b</sup>    | 0.120 (0.053) <sup>b</sup>  | 0.060 (0.029) <sup>b</sup> | -0.058 (0.088)              | 0.079 (0.069)               |
| Crime in public places  | 0.120 (0.053) <sup>b</sup>    | 0.076 (0.043) <sup>b</sup>  | 0.023 (0.023)              | -0.034 (0.070)              | 0.065 (0.056)               |
| Crime in private places   | 0.003 (0.018)                 | 0.044 (0.032)               | 0.037 (0.018) <sup>b</sup> | -0.024 (0.048)              | 0.014 (0.036)               |
| <b>Middle Point Rd. &amp; West Pt. Road</b>   |                               |                             |                            |                             |                             |
| All Crimes  | 0.008 (0.006)                 | 0.003 (0.007)               | 0.002 (0.015)              | 0.011 (0.007)               | -0.025 (0.011)              |
| Crime in public places  | 0.008 (0.006)                 | 0.000 (0.000)               | 0.007 (0.008)              | 0.001 (0.006)               | -0.014 (0.007)              |
| Crime in private places   | 0.000 (0.000)                 | 0.003 (0.007)               | -0.004 (0.012)             | 0.004 (0.004)               | -0.011 (0.008)              |
| <b>Mission St. &amp; Geneva Ave.</b>  |                               |                             |                            |                             |                             |
| All Crimes  | -0.041 (0.022) <sup>b</sup>   | 0.003 (0.007)               | -0.006 (0.007)             | -0.020 (0.010) <sup>b</sup> | -0.005 (0.004)              |
| Crime in public places  | -0.040 (0.022) <sup>b</sup>   | -0.005 (0.004)              | -0.006 (0.007)             | -0.011 (0.008)              | -0.005 (0.004)              |
| Crime in private places   | -0.001 (0.006)                | 0.008 (0.006)               | 0.000 (0.000)              | -0.010 (0.006)              | 0.000 (0.000)               |

Standard errors are in parentheses. The absolute changes are the before-after changes for the specified location at the specified distance from the camera. The relative change is the difference in the change in crime rates between the specific site receiving a camera and all other sites that do not contemporaneously receive a camera. Means are based on the 209-day period before installation and 264-day period afterward.

- Statistically significant at the 1 percent level of confidence.
- Statistically significant at the 5 percent level of confidence.
- Statistically significant at the 10 percent level of confidence.

## **Analysis of Findings**

The empirical findings from our analysis are several. First, we find very little evidence of an impact of the Community Safety Cameras on violent crime. In the raw means, there does appear to be a decline in homicide near the cameras and an increase further away. However, upon closer examination of the details of each of the homicides, the variation observed is consistent with random variability in homicide counts within the areas surrounding the CSCs. Second, we find fairly consistent evidence across a myriad of empirical tests that the installation of CSCs at nineteen locations throughout the City has had a statistically significant and substantial impact on property crimes within the areas in the Community Safety Cameras' view. We observe pre-post declines in property crime in excess of 20 percent and for crimes occurring in public, as high as 30 percent. There are no comparable declines in crimes occurring further from the cameras and no increase in crime in more distant areas either absolutely or relative to a set of comparison regions. Last, we find very little evidence of an impact of the cameras on other types of offending, such as vandalism and drug crime.

The empirical findings in this study fall in line with other evaluation studies conducted of video surveillance systems. A 2006 summary of evaluation research findings in the Department of Justice's Problem Oriented Policing Guide on video surveillance notes that, in general:

- [Video Surveillance] is more effective at combating property offenses than violence or public order crime (though there are have been successes in this area).
- [Video Surveillance] appears to work best in small, well-defined areas (such as public car parks).
- The individual context of each area and the way the system is used appear to be important.
- Achieving statistically significant reductions in crime can be difficult (i.e., crime reductions that clearly go beyond the level that might occur due to the normal fluctuations in the crime rate are difficult to prove).
- A close relationship with police appears important in determining a successful system.
- There is an investigative benefit to [video surveillance] once an offense has been committed.<sup>92</sup>

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<sup>92</sup> Ratcliffe, Jerry. Video Surveillance of Public Places. Problem-Oriented Guides for Police, No. 4. U.S. Department of

In this section we will offer several hypotheses that help explain the empirical findings in this study as they relate to the deterrent effect of video surveillance and the City's strategy in deploying the CSC program. In Chapter 3 we will examine the factors and contexts specific to this program that may have affected its deployment.

We should note that while most of the interviewees we spoke with were critical of the deterrence value of the CSC program, not all were. Said one SFPD inspector: "Most of these criminals are repeat offenders, so if a camera works—it's not going to work just because the camera is there, [but] because they're going to forget about the camera and they are going to commit the crime and they're going to think they are going to get away with it . . . but if the camera helps you make the arrest, the deterrent is going to be that individual that commits twenty shootings . . . we get that person off the street." However, most interviewees identified a number of flaws with the general deterrence strategy, which we examine here in turn. As one former member of MOCJ explained, "The cameras are only going to be as good as our implementation strategy. And if we go into this process with a strategy that's flawed, then we shouldn't be surprised by the outcome."

### **Nature of Violent Crime and Gang Violence**

The property crimes largely deterred by this system might be crimes of desperation, but they are likely not crimes of passion, as homicides are typically characterized. Violent crimes are difficult to deter not only because they are often committed outside the bounds of rationality, but also because in relation to other crimes they are rare events, and as such there are simply fewer of them to deter. According to one SFPD inspector, more cameras might mean suspects are easier to capture, but it wouldn't necessarily stop these crimes from occurring: "[Cameras] could catch them if they were good cameras . . . but would they really deter them? No. No. The people that I have seen in the last ten years that commit homicides they just don't care. They don't care. Sometimes they *know* they're on camera [and] they just don't care. They're going to do what they're going to do so I don't think it's going to deter them."

The nature of gang violence itself raises the question as to whether or not it is the type of crime that is best suited to video deterrence. As one SFPD inspector noted, cameras may have an impact on the

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Justice Office of Community Oriented Policing Services: 2006.

behavior of gang members who live near them, but violence between gangs often occurs when a rival gang crosses turf lines. “The gang that’s coming into the turf, that’s going to create the violence . . . they don’t know where the cameras are 90 percent of the time. If you’ve got a Bayview gang coming into the Mission . . . they don’t know where the cameras are, because they’re not there every day looking at them, so it’s not going to deter that crime at all, because most of your gang violence is heat of passion. So I think it’ll stop a lot of the close gangs that tend to border along one street; it’ll stop them, but it ain’t going to stop Bayview from going after Mission or Northern from going after Bayview.” The issue of outsiders coming into “foreign” neighborhoods with criminal intent was also raised with regard to public housing, where several officers noted that in many cases the most significant troublemakers in public housing areas didn’t actually live in them—these are the so-called “commuter criminals.” It is possible in these instances that cameras could capture criminal behavior by those unaware of the CSCs, but that the presence of the CSCs wasn’t likely to deter these incursions without the immediate feedback of police action.

Again, as mentioned earlier in this section, the concept of deterrence relies on demotivating the potential offender, and in many instances of violent crime, threat of capture is not enough to do so. One SFPD inspector relates, “There was one [case] where a kid—I call him a kid because I think he was somewhere between 18 to 22—walked into a gym in the middle of the afternoon in front of twenty-two other kids and blew a guy away. Yeah, I don’t see [the cameras] as a deterrent, I really don’t. You go around the corner to where there isn’t [a camera].”

### **Lack of Feedback Cycle**

*“Initially when they came out I think [criminals] were aware because they would hang out in different areas [than] where the cameras were but when the type of stuff that they’re involved in kept happening and they realized they weren’t getting arrested, nothing was happening because of those cameras. I don’t think [the CSC program] works as a deterrent at all. I think if you look at the crimes that have occurred in these areas it hasn’t slowed or stopped at all.”*

—SFPD Inspector

A significant issue with the City’s forensic approach is the lack of a feedback cycle the forensic approach presents to those who dare commit a crime beneath a camera’s gaze. Because the CSCs are not used proactively, if criminals make a direct connection between an action performed in front of a CSC and a later arrest, it typically is both significantly after the fact and a generally rare occurrence. SFPD

officers are requesting footage on an average of three times per month, and as we discuss in the next chapter, it is rare that the footage can actually identify an individual. As one SFPD inspector noted, “If your approach is to use a camera for its forensic value, does it really impact crime, violent crime in particular? Because there’s no immediate consequence to the behavior.”

Clearly, as our empirical findings show, both the presence of the cameras and the signage has had some impact on property crime at CSC locations, as does likely a misperception by some San Franciscans that the cameras are monitored in real time, and these factors may have made criminals committing property crimes reconsider doing so near camera installations. While it is outside the scope of this project to conduct a qualitative examination of residents’ perceptions of CSCs and opinions about the CSC program in communities in which CSCs are located,, CITRIS researchers conducting site visits were approached by local residents who shared their perceptions of the CSCs. A group of residents in the Alemany neighborhood in particular were emphatic that the cameras had no effect because “people are still getting shot in front of them,” drawing the connection between crime occurring in front of the cameras and the lack of immediate police response. Many of these neighborhoods are small and self-contained, and it may not take long before news travels within a community that there appears to be little or no consequence to continuing to commit crimes in front of the CSCs.

### **Lack of Alignment of Goals with Policing Tactics**

*“The cameras, as part of a comprehensive strategy, are going to get us the most benefit. And that comprehensive strategy needed to look at lighting in areas where there was believed to be a need for cameras. It needed to look at the deployment of police resources. It needed to look at some of the social issues related to those communities . . . all those things need to be part of the public safety strategy because they all impact crime.”*

—Former MOCJ Director

It is clear from talking with a variety of City public safety employees that both the SFPD and the MOCJ were deploying a variety of strategies to combat crime over the duration of the CSC program. However, it does not appear that the Community Safety Cameras were actively integrated into any of these strategies, primarily due to the system’s design. Given the CSC system’s reactive and forensic focus, there likely was little means for integrating the cameras into tactical crime-fighting strategies. As one former MOCJ member commented, “What frustrated me more than anything else during my tenure [at MOCJ] was this belief that some people had in the community that the . . . Community Safety Cameras

somehow were going to, in and of themselves, be the entity that reduced certain kinds of crime in the neighborhood.”

In contrast, both the cities of Los Angeles and Chicago use their camera systems as part of their strategic approach to fighting crime, but each does so differently. Los Angeles engages in active, real-time monitoring,<sup>93</sup> whereby an LAPD officer (generally on modified leave) monitors a set of cameras on his or her beat, akin to patrolling by car; in fact, if an arrest is made, the camera operator is listed as an arresting officer. The officer is generally in radio contact with other officers on the beat and uses the camera system both to respond to other officers in the field and to proactively search for criminal behavior. In contrast, Chicago police also actively monitor their cameras, but the city has such a high number of cameras that proactively monitoring all of them on a twenty-four hour basis would be prohibitive.<sup>94</sup> Instead, in addition to using real-time crime statistics to focus on hot spots, in some locations monitoring officers use their cameras to respond to calls for service and back up officers in the field instead of searching for potential crimes in progress.

While these examples aren’t intended as an endorsement for active monitoring—an approach whose positives and negatives this report will address in detail in the final chapter—they illustrate how surveillance camera systems can be used in conjunction with specific tactical objectives. In both Los Angeles and Chicago, cameras are deployed directly in conjunction with other tactical goals; neither city takes the approach that cameras in and of themselves can prevent crime without other strategies in effect. These cities integrate camera use deeply into their day-to-day policing practices, an approach that in turn encourages a sense of ownership in the system among the officers.

### **Physical CSC Deployment Strategy**

*“If you’re going to have fixed cameras then fine, then saturate an entire area so that you have it from this angle, that angle . . . we just don’t have that and so these guys, they look at it and—they know these cameras—and the first day they’re looking up, okay, well, shoot let me not do this right in front of the cameras because the police are going to be here in a minute. Let’s see. Wait a second. Okay, they ain’t coming . . . next thing you know, ‘Hey, I got a gun. Nobody’s coming.’”*

—SFPD Inspector

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<sup>93</sup> The LAPD does not monitor all of its cameras on a twenty-four hour, seven-day per week basis.

<sup>94</sup> Chicago also does not monitor all cameras on a twenty-four hour, seven-day per week basis.



As we noted at the introduction to this subsection, evaluation research generally shows that video surveillance tends to work best in “small, well-defined areas,” most notably parking garages, where the area has definitive physical boundaries and movement through the space can be tightly controlled. San Francisco’s strategy with the CSC program to date has been to widely disperse small clusters of cameras throughout the City in a variety of physical locations, from small public housing parking lots in the Western Addition to the major pedestrian and vehicular thoroughfares at 16<sup>th</sup> and Mission Streets and 24<sup>th</sup> and Mission Streets. This wide dispersal of cameras, combined with a limited number of cameras at each location (four on the average) translates into many locations with limited visual coverage.

This strategy may please political and community factions demanding cameras in their neighborhoods. However, it likely has had the effect of diluting the cameras’ power, first by focusing on a single area in a broader neighborhood that could potentially benefit from the increased guardianship camera systems have the potential to provide, and second, by only providing limited coverage in the areas in which they were installed. The risk here is that in an effort to include as many neighborhoods as possible, the cameras may have been spread too thinly among too many locations. As we will discuss in detail in the final chapter, an alternative to consider is to limit the number of geographical locations that receive cameras, but to comprehensively cover the areas in which they are installed. Los Angeles appears to have had success with this strategy at its MacArthur Park installation, though this strategy was also aided by an increased commitment of tactical policing resources with the goal of making a permanent change to the character of the neighborhood by reducing the tolerance for serious crimes as well as general public disorder.

## **Summary**

*“The number of compromises the City made to do this program really raised questions for me whether or not it was a valuable asset other than [for the] perception of residents.”*

—Former MOCJ Director

In conclusion, the primary goal of deterring violent crime was a mismatch with the design of this reactive, forensic system. As the empirical evidence demonstrates, we found some effect on property crime but no observable effect on violent crime. Again, these findings are in keeping with other evaluation research performed to date.

Should the City wish to continue the forensic approach of the CSC program, a reevaluation of its goals is in order. If violent crime continues to be the City's primary concern motivating the system, it appears that a radical rethinking must occur. If the City believes the documented effects on property crime provide an independent and compelling basis for the program, it may similarly want to reevaluate. For example, current camera placement is driven by violent crime. It may be that redeploying cameras to areas with higher property crime rates may prove even more effective. While other factors have affected the system's overall performance, which we review in Chapter 4 in depth, the fact remains that a forensic, reactive system likely will never have the desired effect of deterring violent crime at a significant level. In Chapter 4 of this report, we will offer a summary of our recommendations for the existing system and present some alternative system design approaches the City can consider as well.

## Chapter 3: Analysis of Performance On Investigatory Use and Secondary Objectives



Figure 3-1: CSC overlooking 24th St. and Mission St. BART plaza

### Introduction

This section documents and analyzes how the CSC program supports the investigatory and evidentiary needs of the criminal justice system, and the secondary objectives—community participation; accountability and oversight; and protection of privacy freedom of expression, and related rights. Through a review of the CSC program policies, procedures, and other system documentation; qualitative interviews with over thirty individuals; and technical aspects (*e.g.* system architecture, hardware, etc.) we provide a context-based analysis of how the CSC program functions in practice and identify areas where the policies and practices, technical features, and program management could be adjusted to better support CSC program objectives and the needs of various stakeholders who interact with the program. We make specific recommendations for improvement in each area, drawing upon our detailed understanding of the operation of the CSC program, existing research on video surveillance systems and comparative information about video surveillance programs in other U.S. cities, and existing guidelines

and best practices in the areas of video forensics, and privacy and civil liberties protection within video surveillance systems.

## **Evaluation of Investigatory and Forensic Use**

### **Benefits of CSC for Investigations**

According to a memo provided by the SFPD, and reviewed by the CITRIS team, as of August 2008 the SFPD made 120 written requests for CSC footage, or approximately three requests per month over the past three years.<sup>95</sup> Through August 2008, there were nearly as many requests as in the first two and one-half years of the program combined, demonstrating a steady increase in the use of the CSCs by SFPD as well as in 2008 by the Public Defender's office.

### *Confirming and Exonerating Suspects*

Correct and early identification of suspects is essential to effective investigations and prosecutions. The SFPD records show that CSC program footage has assisted the SFPD in charging a suspect with a crime in six cases since the program began in 2005.<sup>96</sup> All six of the cases in which the CSC program footage proved useful were investigations by inspectors in the Gang Task Force unit. Three of the cases were attempted homicides, one at the Buchanan and Eddy intersection and two at the Alemany and Ellsworth intersection, which resulted in guilty pleas.<sup>97</sup> One case involved an assault with a deadly weapon and a parole violation occurring at the Turk and Taylor intersection; the final charge reflected the parole violation. One case, occurring at the intersection of 26th and Shotwell Streets, involved a concealed and loaded firearm.<sup>98</sup> One pending case involves multiple charges related to the

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<sup>95</sup> DEM performed the tracking of these requests; they provided a spreadsheet containing information about the department making the request, the date the requests for footage were made, the location of the camera from which footage was requested, the relevant incident/case number, and in some instances the relevant computer assisted dispatch (CAD) number, current as of August 2008. The SFPD then used this information to determine that their department made a total 120 requests. The CITRIS team attempted to verify this number and came up with a number of minor discrepancies. This may have partially been due to missing information on the spreadsheet; at least four of the entries attributed to SFPD were missing both an incident report and a CAD number. There were also a number of duplicate requests.

<sup>96</sup> An SFPD Memo on Crime Scene Camera Information, August 22, 2008, provided to CITRIS researchers gives an overview of SFPD use of the CSC program. The memo states that CSC program footage has led to the arrest of a suspect in six cases handled by the Gang Task Force unit; however the memo from the Gang Task Force unit appended to the memo documents only five cases in which CSC program footage was relevant.

<sup>97</sup> The sentences for two of the cases were three years, and the third case was five years. A disposition on the sixth case was not available at publication time.

<sup>98</sup> California Penal Code 12025 carrying a concealed weapon and 12031 carrying a loaded firearm.

possession of a loaded assault weapon in a gang area.<sup>99</sup> The SFPD reports that cameras have assisted with “confirming and exonerating possible suspects, direction of travel for the suspects and locations of witnesses or other possible victims” in addition to assisting with these six arrests.<sup>100</sup>

The CSC program’s cameras are not monitored and therefore cannot be redirected to focus on areas of interest. The fixed field of view<sup>101</sup> limits the percentage of an image captured by a CSC that is in focus.<sup>102</sup> The decision not to monitor and manipulate the cameras (leaving the focus indeterminately set without respect to where within the field of view activity is occurring), as well as technical limitations discussed in the following chapter, contributes to the generally poor quality of CSC program footage. The poor image quality diminishes the utility of the system as an investigatory tool for SFPD investigators, and as a source of evidence for the DA’s office and defense counsel. Interview subjects overwhelmingly noted that poor image quality, in particular the lack of facial images that can be positively identified, was a severe limitation on the utility of the CSC program footage during the investigation and prosecution of crimes.

Despite the poor quality of the CSC program footage investigators, prosecutors and defense counsel have nonetheless found the system useful.



**Figure 3-2: Nighttime CSC images from 16th St. & Mission St.<sup>103</sup>**

<sup>99</sup> California Penal Code 12031 Carrying loaded firearm; California Penal Code 12280 Possession/transportation/distribution/etc of an assault weapon; California Penal Code 186.22 Bldgs. or places used by street gangs/Confiscation of firearms.

<sup>100</sup> SFPD Memo on Crime Scene Camera Information, August 22, 2008.

<sup>101</sup> While other U.S. cities also rely upon footage from their municipal or police-controlled video surveillance systems for forensic evidence to investigate and prosecute crimes, cameras are often monitored and have pan-tilt-and zoom features that provide a dynamic rather than fixed field of view.

<sup>102</sup> It is possible to use the automatic functions of pan-zoom-tilt cameras to focus on details without actively monitoring a surveillance camera; many cities run their cameras on automatic routines when not monitoring them.

<sup>103</sup> Images courtesy of the San Francisco Chronicle, available at <http://www.sfgate.com/cgi-bin/object/article?f=/c/a/2008/01/28/MN37TKH6O.DTL&o=1>.

### *Sequence of Events and Corroboration*

Several officers noted that even with generally poor image quality, camera footage often allows them to determine a sequence of events for a crime, or to place witnesses at the scene. According to several officers:

- “For a majority of the cases, the images are so poor that there is no way that you can make an ID. However, what it does provide is a sequence of events . . . it allows the inspector to know who is telling the truth.”
- “Even though you may not be able to specifically see the actual details of the event, the entire story this person depicted was being videoed, and it was perfect. That suddenly became my second witness, and that became the community’s savior in the sense [that] no one had to step forward and run that risk.”
- “Cameras show the jurors, it gives them an . . . almost live picture of what was taking place. These [suspects] can say, oh, we don’t even know each other. Well, we got you guys walking together . . . we got clothing that matches, it matches the clothing on the video, so if it is in color, that’s important . . . because you get color descriptions from your victims or your witnesses.”<sup>104</sup>

Similarly, defense counsel reports that the CSC program footage has been helpful as a tool for corroborating or disputing witness accounts. While not a separately articulated goal, CSC program footage, like technologies such as DNA and finger printing, is a source of potentially valuable evidence to the defense counsel as well as the prosecution team. According to the Public Defender’s office, CSC program footage has contributed to charges being dropped on two occasions.<sup>105</sup> In one instance that was covered in the press CSC program footage contradicted the accounts of eyewitnesses. According to the defense counsel representing a charged suspect, “Without these cameras, we had witnesses that gave false statements, and my client no doubt would still be in jail facing murder charges.”<sup>106</sup> With the ability to directly request CSC program footage from DEM, without obtaining a court order,<sup>107</sup> created by the 2008 amendments to the Ordinance, CSC program footage may be more commonly requested and used

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<sup>104</sup> Please note that CSC cameras record in color in daylight; at night, recording switches to black and white.

<sup>105</sup> Public defenders interviewed reported one instance in a robbery where CSC program footage contributed to charges being dropped stating, “the video camera evidence, it corroborated what my alibi witness said, it very clearly showed the co-defendant’s face on it. It was never a perfect alibi. . . . The case wasn’t dismissed for about 70 days but, finally, when it got to the brink of trial and the DA looked at everything that we had, she dismissed the case.” And another instance in a drug prosecution case where according to the public defender “The judge ordered the D.A. to do that [turn over CSC program footage] and, rather than give up the tapes or the video footage, they dismissed the case.”

<sup>106</sup> Dan Noyes, “Anti-crime cameras vindicate murder suspects,” ABC 7 KGO, August 15, 2008. Available at <http://abclocal.go.com/kgo/story?section=news/iteam&id=6331240>.

<sup>107</sup> As we will elaborate, prior to the 2008 amendments defense counsel could obtain footage either through normal discovery channels or by obtaining a court order requiring DEM to release footage to them.

by defense counsel.<sup>108</sup> There is evidence that defense counsel considers the CSC program footage a source of potentially useful evidence; between April 2008 when the Ordinance was amended to establish the specific mechanism for defense counsel to request CSC program footage from DEM and August 2008 seven requests for footage were made.

### *Cameras As Silent Witnesses*

*“A lot of time in the gang culture they’ll not report anything to the police where the cameras will pick it up and tell us really what happened . . . it’s helping be a the witness to crimes nobody wants to be a witness to.”*

—SFPD Officer

Witness intimidation and, in some communities, a general culture of noncooperation with the police are national problems.<sup>109</sup> San Francisco appears to be no exception. For example, despite a public campaign by SFPD that raised the reward level to \$250,000 in July 2008 for information that would assist in solving sixteen homicide cases, to date no one has provided information to the police. As MOCJ Director Kevin Ryan explained, “[This] tells me there’s a level of fear out there such that even \$250,000 is not going to push people in to the door and cooperate.”

SFPD officers cite several examples of the CSC program footage assisting in cases where witnesses were reluctant to testify; in one case, a SFPD investigator claimed that CSC footage provided enough evidence to allow a thirteen-year-old witness to avoid testifying. However, the quality of the images limits the ability of prosecutors to substitute CSC footage for witness testimony, and the the DA’s office we spoke with noted that even if the quality of the images were improved, CSC footage likely could not be the only evidence presented at trial. As one attorney in the DA’s office describes, witnesses might be “braver if they knew it was on film, because basically the film is corroborating what they had to say. But you’re always going to need the witnesses . . . I don’t think the way technology is

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<sup>108</sup> Public defenders reported that the lack of a clear process for requesting footage led to footage being erased (“We had had other instances where the tape had been requested and not provided. I remember, you know, something like that . . . I mean sometimes they would erase it.”) because the police or DA’s office didn’t make a timely request (“Other times, we’d ask the police, and the police would not put a request in a timely manner. Other times, requests were made to the DA, and the DA had not requested it in a timely manner or there was uncertainty about who was responsible for retrieving the footage (“And so I pushed the DA to get me the footage, even did a motion for the discovery. Months went by without them giving me anything. Telling me first to go to the police, that it’s up to, you know, the police department and I needed to subpoena the police department. Of course, that’s not right because you subpoena the DA’s office and the district attorney goes to the police and gets it from the police. So we talked to the judge. The judge ordered the DA to do that.”).

<sup>109</sup> The recent “Stop Snitchin’” movement appears to have begun in Baltimore, MD and spread nationwide after being popularized by several rap artists. See Kahn, Jeremy. “The Story of a Snitch.” *The Atlantic*, April 2007. Available at: <http://www.theatlantic.com/doc/200704/stop-snitching>.

today that a jury is going to entirely trust what is on film. They're going to wonder, 'Well, what's off film that we don't know is going on?' I don't think it's going to be enough for [a jury] to return a conviction on someone if something is on film . . . unless it's the perfect film."

In contrast, some officers reported that witnesses were less willing to testify when they suspected that the cameras had caught the incident on film: "[Witnesses] make reference to the camera . . . it's like, 'You have the camera, you don't need us.'" Another inspector added: "I've had cases where people—in fact a guy who got shot a couple of months ago, we went out there and talked to all those buddies who we *know* watched it. 'Well, you got it on camera! We don't need to talk to you. You got the cameras. We don't need to tell you nothing.'" These and other anecdotal reports from our interview subjects tell of witnesses becoming more reluctant to testify when they believe CSC program footage exists because they believe it is sufficient on its own to bring criminals to justice.

On one hand, if juries will not convict on camera footage alone, regardless of how good it is, as suggested by the attorney quoted above, then the SFPD officer reports' of reduced cooperation by witnesses who believe the CSC program footage alleviates the need for them to serve as a witness or talk with police may be extremely problematic. On the other hand, if the existence of the camera footage emboldens witnesses because it supports their recollection of events, and perhaps witnesses believe the footage raises the possibility that a conviction will result, thereby limiting the possibility of retaliation, the CSC system might be of significant value during the investigation and prosecution phase. The qualitative data on this point, gathered during our study, is too thin to support either conclusion<sup>110</sup>; however, the possibility that the existence of CSC footage may affect levels of witness participation and community participation in opposite ways elucidates the complexity of drawing conclusions about how the CSC program—or another camera program—will integrate into the investigatory and prosecutorial processes. Understanding how the introduction of CSC program cameras affects the actions and beliefs of other witnesses and victims, as well as potential criminals, is essential to meeting a system's objectives. Ideally, additional research would explore how the installation of CSCs affects the willingness of witnesses to talk with the SFPD and participate as witnesses during trial, and how it affects victims.

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<sup>110</sup> Ideally, this information would be collected directly from witnesses, not from the officers.



## Issues with CSC for Investigations

While the SFPD investigators report that CSC program footage has been helpful in securing arrests in a limited number of investigations, and defense counsel, while having more limited experience with program footage, also find it can provide useful evidence, both groups believe the footage is less than ideal.

A number of issues, in addition to image quality (which is addressed in detail in the following section), have limited the CSC program's utility as an investigatory and evidentiary tool, specifically: difficulty of use, inadequacies of the technology, and the lack of system alignment with video forensic guidelines and best practices published by the Law Enforcement and Emergency Services Video Association (LEVA), a practitioner group offering expert advice and education for forensic investigators who specialize in video and digital media.

### *Difficulty of Use*

Interviewees report that the process of making a request to DEM for footage is straightforward (requiring filling out a paper-based request form and obtaining an appropriate approval signature). However, some SFPD investigators report finding the process too cumbersome and slow in some instances, and seeking to limit the workload for DEM and the SFPD supervisors created by requests for copies of CSC program footage.

CSC footage is searched, identified, retrieved, and copied to DVD recording media for distribution to authorized requestors by staff of the Custodian of Records Unit of the DEM. Staff members include both permanent and temporary employees with typically basic computer familiarity; several members of the Records staff are 911 dispatchers on rotation through the records unit with experience using the department's Computer Aided Dispatch system (both for dispatch and records management). At present, footage is retrieved by DEM staff using a single on-site computer authorized for this purpose; users are required to authenticate themselves before using the system, and login attempts are logged.<sup>111</sup> The on-site system is a significant improvement over past processes that required staff to travel off site to the DTIS radio shop in the Bayview area to complete a retrieval request; at some point, CSC servers were configured to allow DEM employees to remotely access CSC servers from the DEM office. This represented an improvement not just in the time lost to travel, but also because

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<sup>111</sup> It is unclear to us if these logs are audited regularly.

burning footage to DVD proceeds at a 1:2 pace; one hour of footage requires two hours of recording time (it is unclear how much time downloading from the server adds to this process, but staff complain that the connection is slow). Indeed, even with the on-site access the time required to burn footage was a primary complaint of DEM staff. Because the process can fail at any point during the transfer, it requires the user to pay close attention during the burn process in order to ensure success. DEM staff must time burn processes carefully, as the system is set to purge old data every four hours during every twenty-four-hour period, and DVD burning cannot proceed at those times. Purging appears to take approximately ten minutes to complete. While apparently two requests (each for a single camera) can be processed simultaneously, the availability of a single computer with a single DVD burner limits capacity to only one staff member working at a time, and only one DVD can be produced at a time. Furthermore, for requests that ask for footage from multiple cameras at a single location, recordings must be located and burned for each camera separately. Since the pilot CSC program began in 2005, the number of requests has steadily increased each year, and the 2008 Ordinance changes that allow defense counsel to request footage are increasing the number of requests by approximately 50 percent, according to DEM.

Given the limitations at DEM, investigators' concerns about the time required to retrieve a copy of CSC program footage and about burdening DEM with requests that produce irrelevant footage appear well founded. As a result of these concerns, some investigators reported visiting the DEM office to review footage for a particular time and date prior to making a request for a copy of that footage.<sup>112 113</sup> An exigent circumstances exception allows investigators to access footage prior to filing a written request, and it may be that investigators interviewed were proceeding under this exception.<sup>114</sup> During our interviews investigators did not explicitly state that they were using the exigent circumstances exception and we were provided with no records indicating that this exception has been used,<sup>115</sup> however some reported that when footage was relevant they subsequently filed a written request for the

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<sup>112</sup> The Ordinance does not explicitly prohibit SFPD from viewing the footage at DEM, but the structure suggests that Section 19.6(b) is designed to constrain all access to CSC program footage. Section 19.3(a) limits "review" of footage to SFPD rank of inspector or higher and for the purpose of investigating specific crimes. Section 19.6(b) limits how SFPD inspectors can obtain "copies" of CSC program footage, and provides an exigent circumstances exception that allows the filing of the forms and approval to occur after DEM has "released" the footage to them. The inconsistent and overlapping terms in the ordinance create ambiguity.

<sup>113</sup> We know from interviews that on at least one occasion DEM has agreed to preserve footage for a public defender both prior to the 2008 Ordinance amendment and prior to the receipt of a footage request from an SFPD investigator.

<sup>114</sup> DEM did not have a separate form or process for recording exigent circumstances requests for the time period in question.

<sup>115</sup> The exigent circumstances exception requires a request for footage and the necessary SFPD approvals to be subsequently filed 19 S.F., CAL., ADMIN. CODE § 6(c)(1) (2008). Again, DEM did not have a separate form or process for recording exigent circumstances requests for the time period in question; therefore, it is difficult to determine whether requests for footage were made explicitly under this exception.

footage, as required under the exigency exception. However, where footage was found to be irrelevant, they reported not filing requests.<sup>116</sup> Interviewee comments suggest that the practice of reviewing footage at DEM was driven by a desire to act quickly to investigate a crime.<sup>117</sup> As one investigator explains, “[If] it’s something that had just occurred and the suspect is—it’s a good likelihood that you could make an arrest, and it was possibly involved in an area that has video there, then we would go over [to the DEM] . . . and look at their videos right away.”

It appears that the standard process set out in the Ordinance does not always mesh with the needs of police or respect the resource limitations of DEM, as discussed in Chapter 4. However, to the extent that some requests to view footage, as opposed to obtain copies, are not captured in DEM logs it limits the ability to accurately assess all SFPD use of the CSC program footage.



**Figure 3-3a: Nighttime CSC image from Turk St. and Taylor St. intersection**

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<sup>116</sup> The exigent circumstances exception requires a request for footage and the necessary SFPD approvals to be subsequently filed. 19 S.F., CAL., ADMIN. CODE § 6(c)(1) (2008). This could reflect a failure to file paperwork or it could suggest that at times view only access was not requested under the exigency provision.

<sup>117</sup> There was no evidence that investigators reviewed footage in instances where they could not have requested copies of it.



**Figure 3-3b: Nighttime CSC image from Turk St. & Taylor St. intersection<sup>118</sup>**

The process for accessing CSC program footage should be reformed to provide accountability and auditability for all footage use, and particularly to create a separate process for investigators to view footage related to an investigation of a specific crime on site at DEM prior to following the process for requesting footage under the Ordinance. Such view access would reduce the load on both DEM and SFPD associated with the identification of relevant evidence in the CSC program footage. Audit logs of such access should be maintained and should include the identity of the requestor, an incident or computer aided dispatch (CAD) number,<sup>119</sup> the specific crime under investigation, the footage reviewed, and whether or not a copy was later requested.

#### *Inadequacies of the Technology*

The primary criticism voiced by SFPD officers and the DA's office was that the quality of the CSC program footage is poor—specifically it does not support the identification of individuals or capture details such as license plate numbers. Later in this section we will discuss the technical limitations of the existing CSC system, but for now, it is important to note that while upgrading the image resolution would be a marked improvement, it won't necessarily guarantee the ability to identify individuals.

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<sup>118</sup> Figures 3-3a and 3-3b are CSC images released to the public after being presented as evidence at trial.

<sup>119</sup> It is possible that in some instances an incident report or crime report number may not yet be assigned at the time of the request.

Many factors make identification a challenge. For example, the cameras' height and placement, suspects' ingenuity, and lighting quality can each pose unique challenges to human identification. Due to vandalism concerns, the cameras are placed approximately twenty feet above ground level, and that factor, combined with the fixed-focus lenses, severely constrains the amount of the image captured that will be in focus.<sup>120</sup> Suspects have shown great ingenuity in disguising their identities. Where a crime is premeditated, subjects may take care to obscure their faces or to wear generic clothing. According to one interviewee, "Many of the guys who are involved in crimes of violence know to wear a hoodie. Hoodies are really popular now; their hoods are always up, so all you're going to see is a sliver of face. Or they're going to wear a hat with a brim . . . it's amazing how they modify their clothing to hide themselves." These strategies of obfuscation work as well, if not better, to defeat the camera's ability to capture images to support identification as they do to defeat a live witness's ability to produce a positive identification.

Finally, lighting quality, both fluctuations in natural light based on the time of day and environmental obstructions, as well as artificial light, impacts the CSC program's ability to produce images that can be used to positively identify suspects. As one SFPD officer noted, "Everything interesting happens after dark." Because much crime occurs at night, even with improved resolution and appropriate artificial lighting, image quality is dependent upon the cameras' night-vision capabilities. Due to the slower frame rate required to capture sufficient light in the dark, the CSC program cameras cannot produce images comparable to those captured during daylight hours. Says one investigator about the CSC program footage: "The quality at night is very poor. They don't catch every frame, so if somebody runs at night, you just get blobs, so you lose a certain amount of footage." In the following chapter we make several recommendations to improve the overall quality of the camera footage.

### *Alignment with Video Forensic Guidelines and Best Practices*

DTIS considered the forensic repercussions of the system's configuration: as one DTIS employee explained, "even though there isn't [a] formal process in requirements here, we need to start thinking [that] this will end up in court . . . everything that we do we keep it in the frame of mind that this is going to be in front of a jury."<sup>121</sup> Unfortunately, the SFPD's forensic video analyst, a twenty-six-

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<sup>120</sup> For example, the cameras may be optimized to focus on a distance of thirty feet, which means anything outside of that optimum range may be out of focus.

<sup>121</sup> CITRIS interview with DTIS staff.

year veteran of the department who is undergoing LEVA—a professional organization that publishes guidelines and best practices with regard to the capture and treatment of video evidence—certification, was contacted only once by DTIS in 2005 before any cameras were purchased. He was never subsequently contacted or consulted about the CSC program. This analyst has worked with CSC footage on many occasions, and criticized the height and placement of the cameras, the poor recording rate, and low lighting at some locations (technical issues will be explored in depth later in this chapter). The development of the CSC program would have benefited from the involvement of this individual or another person familiar with the LEVA guidelines.

The lack of ongoing attention to the relationship between user needs—in this case, of the investigators and prosecutors—and the CSC program configuration is evident in several areas. One stark example discussed during interviews was the discovery by SFPD investigators that some of the CSC camera clocks were not synchronized with the DEM’s CAD system, causing substantial confusion for investigators. This problem was fixed, but it highlights the need both for sufficient program management and oversight (discussed in detail later in this chapter), the development of detailed requirements that relate the system to end-users’ needs (including other systems with which the CSC program must be coordinated), and assurances that the system is in compliance with best practices. An error such as this could have caused investigators to miss important evidence due to inaccurate time stamps, or could have compromised evidence used during trial, undermining faith in the accuracy of the CSC program footage.

### **Prosecution and Defense Investigatory Issues**

In interviews, both the DA’s office and public defenders reported that they were not consulted during the initial design of the CSC program. From the perspective of the DA’s office, the police investigators gather and produce the primary investigative information, but the utility of the system depends on how well it meets the DA’s needs (and even later, a jury’s) during the prosecution process. Similarly, public defenders critiqued the City for not considering them and the accused as potential users with specific system requirements and access needs.

The DA’s office expressed concern that they were not viewed as the end users of the system. Some of their complaints directly mirrored those of the investigators—namely, the quality of the facial images produced by the CSC program. It is quite likely that the evidentiary value of the footage, as well as

issues about its relation to the standard discovery process would have been raised and addressed during the system design phase if they had been consulted.

The public defender's office objected to the initial Ordinance's lack of a specific process through which they could access CSC program footage directly from DEM, and the retention period, which they viewed as too short. Under the initial Ordinance, defense counsel, like any other agency or individual, could seek a court order compelling DEM to disclose CSC program footage.<sup>122</sup> The 2008 amendments addressed most defense counsel concerns by creating a process for defense counsel to request CSC program footage directly from DEM<sup>123</sup> and extending the retention period for footage. However, as we will discuss, defense counsel and MOCJ remain concerned with the interaction between the new procedures for access to CSC program footage and standard discovery processes and state and federal law with respect to the rights of the accused and the obligations of the prosecution. In addition, DTIS does not have the capacity to maintain CSC program footage for the time required under the amended Ordinance.

Under the amended Ordinance, defense counsel may request and use CSC program footage in connection to the *defense of the charged criminal case* for which it is requested.<sup>124</sup> Requests for footage by defense counsel must be sent concurrently to DEM and the San Francisco DA's office.<sup>125</sup> Once a request from defense counsel is received, the DEM must preserve the recording for 180 days and send a copy of the requested footage to the DA's office.<sup>126</sup> Within five days of receiving the footage from

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<sup>122</sup> 19 S.F., CAL., ADMIN. CODE § 6 (D) (2008). The Ordinance does not contain a specific test to govern the court's decision about whether to order such a disclosure. In addition the defense counsel could request footage from the prosecution team consistent with standard discovery in criminal cases. However, according to press statements made by an attorney at the San Francisco Public Defender's Office there were about a dozen instances in which requests for CSC program footage, made through SFPD investigators, were denied because footage had been erased or was otherwise not provided. Buchanan, Wyatt. "S.F. may let suspects get surveillance video," *San Francisco Chronicle*, February 27, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/02/27/BAQLV94AS.DTL&hw=adachi+camera&sn=005&sc=499>. Our interviews support the gist of this statement but we have no documentation that would indicate how frequently this happened.

<sup>123</sup> This includes public and private defense attorneys as well as investigators for the *pro se* criminal defendants appointed by the court. While the DA's office receives the CSC footage in the case file developed and transmitted by the SFPD investigator, and under the Ordinance should automatically receive footage directly from DEM when it is requested in relation to the defense of a charged criminal case by defense counsel, there is no independent provision granting the DA's office the right to directly request footage from DEM. To the best of our knowledge the San Francisco DA's office has neither requested CSC footage nor gone to DEM to view it.

<sup>124</sup> S.F., CAL., ADMIN. CODE § 19.6(c)(2) (2008).

<sup>125</sup> *Id.*

<sup>126</sup> This process is distinct from the process set out in the *Standing Order Regarding Production of 9-1-1 and CAD Records from the San Francisco Department of Emergency Management in Criminal and Juvenile Delinquency Cases*, which governs requests by and production of 9-1-1 and CAD records to defense counsel. The Standing Order prohibits DEM from disclosing the declaration requesting records filed by the public defender or any information contained in the declaration to any prosecutorial agency or employee; however a courtesy copy of the requested records is typically turned over to the DA's

DEM, the San Francisco DA's office may review the footage with the relevant SFPD investigator to determine whether to request a court order preventing the release of footage under existing law.<sup>127</sup> If the DA's office applies for a court order to prevent the release, DEM may not release footage until the court rules on whether it should be produced.<sup>128</sup> The Ordinance places the DA's office and investigator in the position of protecting the witness's interest and places the court in the position of ruling between the defense counsel and the DA's office.<sup>129</sup> In the event that CSC footage is produced, the defense counsel may only disclose it to the defendant and retained experts in the charged criminal case, or with the permission of the court during hearings and trials.<sup>130</sup> Disclosure by the defense counsel to any one else is a misdemeanor punishable by six months imprisonment, a fine of \$1,000, or both.<sup>131</sup>

In addition, the 2008 amendments increased the retention period for CSC program footage to thirty days, although it continues to be retained for only seven calendar days<sup>132</sup>—raising questions about whether this provides sufficient time given the pace at which cases are assigned, hearings scheduled, and defense investigations commenced for defense counsel to identify and request CSC program footage that may be useful to their clients' defense. If footage is purged before defense counsel can request it, "evidence of innocence"<sup>133</sup> may be lost.

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office. After receiving a subpoena from the defense requesting records DEM must provide the court a copy of the subpoena and the declaration from defense counsel; a legible and durable unredacted copy of all the records described in the subpoena; and a declaration of the duly authorized Custodian of Records that complies with the requirements of the Evidence Code section. Where the record or a portion of the record relates to a person or entity other than the defendant, the court may conduct an *in camera* hearing to determine if the defense counsel is entitled to any portions of the records. A protective order surrounds records that are turned over to defense counsel. It prohibits the defense counsel from disclosing or permitting to be disclosed to the "defendant, members of the defendant's family, or anyone else, the address or telephone number of a victim or witness whose name is disclosed in the records, unless specifically permitted to do so by the Court after a hearing and a showing of good cause." The defense counsel may disclose or permit to be disclosed the address or telephone number of a victim or witness to persons employed by the attorney or to persons appointed by the court to assist in the preparation of a defendant's case, if that disclosure is required for that preparation. The attorney shall inform any persons provided this information that further dissemination of the information is prohibited.

<sup>127</sup> S.F., CAL., ADMIN. CODE § 19.6(c)(2) (2008).

<sup>128</sup> *Id.*

<sup>129</sup> In contrast, the Standing Order, discussed in footnote 104, acknowledges that the DEM "reserves the right to move to quash a subpoena on any legal ground," but places the task of protecting witnesses with the court, which receives an unredacted copy of 9-1-1 and CAD files.

<sup>130</sup> S.F., CAL., ADMIN. CODE § 19.3b (2008).

<sup>131</sup> *Id.*

<sup>132</sup> The understanding of the CITRIS team is that the original retention period was 72 hours, which later increased to seven days according to the July 2005 Standard Operating Procedures of the Emergency Communications Department (now renamed the DEM). Despite the 2006 Ordinance stating that retention should not "exceed 14 days" and the 2008 Ordinance increasing the retention time to "at least thirty days but no longer than thirty days," due to funding constraints to increase storage capacity the actual storage time remains seven calendar (not business) days.

<sup>133</sup> Adachi, Jeff. "Commentary: Community, not just technology, needed in crime prevention," *San Francisco Chronicle*, September 13, 2006. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2006/09/13/EDG6PKDT6K1.DTL&hw=adachi+camera&sn=003&sc=819>.



The 2008 amendments to the Ordinance raise questions about how CSC program footage relates to standard discovery processes and state and federal law with respect to the rights of the accused and the obligations of the prosecution. Defense counsel, the current director of MOCJ, and the San Francisco DA's office raised some concerns with this set of issues during interviews. The director of MOCJ, Kevin Ryan, expressed concerns that the amendments would interfere with the traditional discovery process, in particular with the obligations on prosecution to disclose evidence to defense counsel.<sup>134</sup> He expressed concern over the insufficiency of judicial oversight and about the risk of straying from the "tried (and tested)" process that protects witnesses.<sup>135</sup> Raising a similar set of concerns about the relationship between standard discovery requirements, a public defender stated that "[w]here there's a camera at the scene of a crime, there's a duty by the prosecution and the police to review the camera to make sure there is no exculpatory information. I have never heard anyone put it that way, or a court rule in favor of that, but there's a certain legal argument to be made that that the cameras create a duty."<sup>136</sup> He continued, "If police are given control over the camera footage" or "(i)f the police, or even the District Attorney, has exculpatory information in their hands, they have a duty to turn over that information. And not only a duty to turn it over, but they have to do more, they must actively look for and investigate whether or not there is exculpatory evidence."<sup>137</sup> In addition, the public defender raised concerns that the Ordinance's disclosure process, which requires DEM to send a copy of the CSC footage requested by the defender to the DA's office, would impair his "6<sup>th</sup> Amendment duty to investigate a client's case in confidence."<sup>138</sup> While a detailed legal analysis of these issues<sup>139</sup> is beyond the scope of this report, the

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<sup>134</sup> Buchanan, Wyatt. "S.F. may let suspects get surveillance video," *San Francisco Chronicle*, February 27, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/02/27/BAQLV94AS.DTL&hw=adachi+camera&sn=005&sc=499>.

<sup>135</sup> Id.

<sup>136</sup> Phone interview with Eric Quandt, San Francisco Public Defender's Office, August 6, 2008.

<sup>137</sup> Id.

<sup>138</sup> Id. It is normal for a defense attorney to obtain evidence—subpoena information and documents from entities, secure the services of expert witnesses and obtain their opinions—in confidence, and without disclosing such requests to the police or the District Attorney's office. Under the Ordinance DEM must disclose the CSC footage requested by defense counsel to the District Attorney's office. As discussed in footnote 124, the DA's office similarly receives a courtesy copy of the CAD records requested by defense counsel, but the Standing Order prohibits DEM from disclosing the declaration requesting the records or any information contained in the declaration to any prosecutorial agency or employee. The provision appears responsive to the difficulty a judge may have in figuring out whether a segment of video footage will compromise a witness. It is simpler to identify and remove information that could compromise a witness from a 9-1-1 or CAD record, such as name and address, than it is to determine whether or not video footage which may, based on a defendant's knowledge of the neighborhood, facilitate witness identification through relationships, styles of dress, type of automobile, a person's gait, and other factors that fall short of a clear image of a witness's face. Absent this detailed information about a particular neighborhood or incident the task of determining whether the release of footage would put a witness in danger would be difficult. The CSC Ordinance looks to *the SFPD investigator*, who has the context-specific information, and who can consult with the DA's office, to understand how the footage might compromise a witness or investigation rather than placing this responsibility fully on the court.

CSC program's relationship to existing law affects both how it is used and its overall utility, and thus merits consideration here.

The scope of the prosecution team's discovery obligations with respect to CSC program footage held by DEM may have substantial effects on the resources necessary to support the CSC program. The DEM, not the SFPD, receives and stores CSC program footage—DEM is the custodian of the footage.<sup>140</sup> As the Custodian of Records, DEM is responsible for ensuring that releases of CSC footage comply with the Ordinance.<sup>141</sup> The Ordinance structures the SFPD's access to copies of CSC footage, limiting who may request it, the purpose for which it may be requested and used, and creates a paper trail of requests. The Ordinance evinces efforts to reinforce the boundary between the SFPD and DEM. However, as we have already discussed, interviews with SFPD investigators revealed that they have viewed CSC program footage at times without filing written requests as required for the release of records to SFPD

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<sup>139</sup> A richer analysis of these issues is no doubt warranted and we are confident the City will undertake it. Three key issues that deserve additional analysis include: 1) what obligations does the prosecution have to identify and turn over CSC program footage that is not contained in the investigatory file, but is nonetheless available to SFPD investigators; 2) to what extent does the requirement that DEM turn over CSC footage, requested by defense counsel, to the DA's office interfere with the defendant's right to have their attorney's collection of evidence and case strategy remain confidential; and 3) how does this mandatory disclosure to the DA's office and the DA's office's ability to object to disclosure interact with general prosecutor duties to disclose exculpatory evidence under state and federal law.

<sup>140</sup> While outside the scope of this project the question of access to footage under the public records act is an important consideration for entities, including San Francisco, when establishing and expanding video systems. If CSC footage were found to be accessible under the CPRA and requests were made it could quickly overwhelm the capacity of the staff and system and could raise substantial concerns about uses of footage outside the limited context of specific criminal investigations it is intended to support. DEM, the city agency responsible for managing requests for CSC records, interprets the Ordinance to prohibit it from disclosing video pursuant to a CPRA request. S.F. DEPT. OF EMERGENCY MGMT., RELEASE OF PUBLIC RECORDS: POLICIES AND PROCEDURES, NO. 06.01.05 (May 29, 2008). Available at [http://www.sfgov.org/site/ecd\\_index.asp](http://www.sfgov.org/site/ecd_index.asp). However, no California court has addressed whether a City ordinance constitutes a "statute" that can create exemptions to public disclosure under the CPRA. The question depends on what kind of legislative authority San Francisco's Board of Supervisors wields. For an example of how another city addressed the issue with regard to FOIA, *See Newspapers, Inc. v. Metro. Police Dep't*, 546 A.2d 990, 998-99 (D.C. 1988). The District of Columbia Court of Appeals held that a municipal ordinance limiting public disclosure of arrest records was not a statutory exemption to FOIA, because the city's Board of Commissioners was not authorized to draft a "statute." However, even if the Ordinance cannot exempt all CSC footage, the CPRA exemption for "[r]ecords of . . . investigations conducted by, or records of intelligence information or security procedures of . . . any state or local police agency . . . or any investigatory or security files compiled by any other state or local agency for correctional, law enforcement, or licensing purposes" (CAL. GOV. CODE § 6254(f) (2008).) clearly would exempt CSC footage where there is an actual prospect of specific law enforcement proceedings. *See Uribe v. Howie*, 96 Cal. Rptr. 493 (Cal. App. 4th Dist. 1971). This exception would not however protect the bulk of the CSC program footage.

<sup>141</sup> S.F., CAL., ADMIN. CODE § 19.6(a) (2008). To facilitate proper handling, DEM provides a form for CSC footage requests to be used by investigators and defense counsel. A printable version of the camera recordings request form on is on the Department of Emergency Management website, [http://www.sfgov.org/site/uploadedfiles/ecd/Request for Community Safety Camera Recordings.pdf](http://www.sfgov.org/site/uploadedfiles/ecd/Request%20for%20Community%20Safety%20Camera%20Recordings.pdf). The form requires the defense counsel or SFPD to declare under penalty of perjury that the requester is eligible to receive the video under the Ordinance, and to state the pertinent criminal case number.

investigators under either the standard procedure or the exigency exception of the CSC Ordinance.<sup>142</sup> As discussed above it is unclear whether such view access has occurred under the exigency exception or not. To the extent it has occurred outside the exigency exception it suggests a it may suggest a closer relationship between the SFPD and DEM and thereby expand the scope of the prosecution's obligation to seek out and disclose exculpatory information contained in the CSC program footage to defense counsel.<sup>143</sup> The scope of the prosecution's duty in this context has implications for the CSC program.<sup>144</sup>

Concerns over the scope of the prosecution's duty to identify and provide exculpatory information in CSC program footage are subtly shaping the use of the CSC program. One SFPD investigator we interviewed said that police are starting to pull footage every time there is a camera near a crime scene whether they believe it is likely to be useful or not,<sup>145</sup> to avoid charges from defense counsel that they were negligent in failing to check the recordings. Investigator requests for CSC program footage rose from once every three weeks on average in 2007<sup>146</sup> to approximately three times per month according to information provided to us by SFPD. One interviewee is concerned that increased demands for footage (where it is extremely unlikely to yield evidence) may tax the resources of DEM, either leading the SFPD to limit requests or leading DEM to turn down requests. This interviewee pointed to the example of lab tests where police inspectors' requests are often denied by overworked lab technicians who must weigh costs and prioritize needs in deciding which requests to

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<sup>142</sup> Again, we must stress that nothing in our research indicates that investigator viewing CSC program footage at the DEM facility did so for purposes other than the investigation of a specific crime or that the individuals reviewing footage were anyone other than those authorized under the Ordinance to request copies.

<sup>143</sup> If viewing of footage happens outside the exigency exception, it would reflect a less formal relationship between the SFPD and DEM with respect to the CSC program footage. This in turn could lead to a conclusion that the SFPD may be exercising sufficient rights over the CSC footage to be considered in constructive, although not physical or actual, control of the footage for the purpose of discovery obligations. Such a conclusion may raise more questions than it answers in that it is unclear what the scope of the prosecution's proactive obligation would be with respect to the totality of the CSC program footage in any given case. A conclusion of constructive control would support the position that a duty to search for and disclose exculpatory evidence would arise at least where the defense requested footage. However, again, the scope of such an obligation is extremely unclear; for example, could a defense attorney request for all exculpatory information in the CSC system force prosecutors to review all footage?

<sup>144</sup> Once information is disclosed by DEM to the DA's office (as required under the ordinance where defense counsel requests footage) or is provided to the DA's office in an investigator's file, the prosecution has an obligation to turn over exculpatory information contained therein to the defense counsel. While the Ordinance provides the DA's office with a process for seeking to limit the disclosure of records by DEM, this does not limit its own obligations under federal and state law to disclose exculpatory information in its possession. It is unclear how a court would resolve the issues presented here about scope of the prosecution team's disclosure obligations.

<sup>145</sup> The investigators displayed detailed information about the limitations of the current cameras in areas where they have conducted investigations. They might know, for example, that footage will be unhelpful because the camera is pointing in the wrong direction, or is oriented too high to see the area in question.

<sup>146</sup> Bulwa, Demian and Stannard, Matthew B. "Bay Area police defend the use of surveillance cameras to make streets safer, but many acknowledge the systems in San Francisco have some shortcomings," *San Francisco Chronicle*, August 17, 2007.

Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/08/17/MNU0RJUQ7.DTL&hw=newsom+camera&sn=014&sc=414>.

fulfill. The 2008 amendments expanding the number of individuals who are likely to make requests, and the copies that DEM must make of footage when it is requested, may surpass the number of requests to which DEM, with its current staffing and technology, can respond to in a timely fashion—just as the expanded retention period for the CSC program footage has surpassed its current storage capacity, a factor we will discuss later in this chapter.

In conclusion, the legal ambiguities latent in the administrative structure and the Ordinance provisions governing access to the CSC program footage, as well as the potential increase in requests for footage under the amended access provisions, are affecting the current demands on the system, and may have a significant impact on the system as the issues are worked out by the parties involved.<sup>147</sup> Similarly, the blanket extension of the retention period surpasses the current resources of the CSC program and will likely be compounded by increased requests for access due to the new defense counsel access provision and the investigators' stepped-up demands for footage. The blanket extension of the retention period also creates increased privacy risk by extending the amount of time records are available prior to destruction.

To resolve these issues, we recommend that the relationship between the CSC program's administration and procedures, and the existing legal obligations and procedures, be further clarified to facilitate planning and resource allocation to support foreseeable program uses. We also recommend that either DEM be provided additional storage capacity to support the longer retention period, or that alternatives to a blanket thirty-day retention rule be considered, and, if necessary the Ordinance further amended to address. It is possible that the purpose—providing defense counsel time to assess whether CSC footage should be requested—for which the camera footage retention period was extended could be achieved through other processes that would place fewer demands on the program's resources and better balance competing interests. For example, an automated process could be established to retain for an extended period of time CSC camera footage relevant to every crime report. This would allow the bulk of the footage to be purged, or, as discussed in chapter 4, preserved at varying rates of compression, within a shorter period of time while ensuring that footage relevant to crimes is maintained and can be made available to investigators and defense counsel as set out under the Ordinance. Some combination of these alternatives could reduce the storage resource issues facing DTIS and DEM.

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<sup>147</sup> For example, one could imagine that the uncertainty about the prosecution's disclosure obligations for CSC footage held by DEM, but not by the SFPD or the San Francisco DA's office, could lead defense counsel to request increasingly larger amounts of footage from DEM to ensure that it was turned over to the DA, as required under the Ordinance, where it would more likely be subject to general discovery obligations.

## **Issues Affecting Secondary Objectives of the CSC System**

As discussed and outlined in Chapter 1, the City’s design and deployment of the CSC program reflected a commitment to several secondary objectives. Those secondary objectives—community participation; accountability and oversight; and protection of privacy, freedom of expression, and related rights—primarily manifest as constraints and limitations on system capabilities, program uses, and users. As discussed in Chapter 1 the Ordinance codified several of these secondary objectives, and other limitations on the system and its operation—such as the lack of monitoring, the decision to disable the cameras during political protests, and the use of technology to block out private spaces that fall within the camera’s view—further reflect the City’s commitment to these secondary objectives. In this section we discuss the extent to which the design choices and policies are advancing the secondary objectives articulated by the City during its deliberations about the project, the Ordinance, and the amendments.

### **Community Participation**

The provisions of the Ordinance that require the public, particularly the affected community, to be included in discussions about the CSC program’s purpose and expansion, the specific places that are under surveillance, and the program’s effectiveness appear to have contributed to awareness of the CSC program and participation in decisions about it. The Ordinance prescribes a notification and approval process for the installation of CSC program cameras, limits the purpose for which they can be installed, and establishes protocols for oversight and access to program footage. In doing so, San Francisco became one of the first cities in the United States to opt for administrative regulation of its video surveillance system.

The process for approving the installation of additional CSCs is designed to involve the community. As discussed in Chapter 1 the Ordinance requires the community surrounding a proposed camera installation to receive prior notice, through the posting of signs by DTIS,<sup>148</sup> and if the City

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<sup>148</sup> S.F., CAL., ADMIN. CODE § 19.5(a) (2008). “At least 20 days before the Police Commission considers a recommendation to install a new community safety camera, the Department of Information and Telecommunications Services (“DTIS”) shall post a minimum of 4 signs, as set forth below, within a 100 foot radius of the location at which the camera is proposed. Signs shall remain posted through the date of approval or disapproval of the camera installation by the Police Commission.” Id.

chooses, targeted mailings to certain individuals and entities.<sup>149</sup> While there were some early issues with the lack of multiple languages on the signs,<sup>150</sup> they have been addressed.<sup>151</sup>

The public, and more specifically the “affected community” are provided a public hearing, by the San Francisco Police Commission, at which they may express concerns with and support for proposed CSC installations. The concerns and support of the “affected community”—expressed during the public hearing or otherwise—are an essential element in the Police Commission’s decision to install, or not install, cameras under the Ordinance. Cameras are to be installed “only in locations experiencing substantial crime and where the potential to deter criminal activity outweighs any concerns asserted by the affected community, and there exists significant support from the affected community for the camera.”<sup>152</sup>

To decide whether or not to install a camera, the Police Commission is directed to weigh the public’s concerns against the potential to deter criminal activity.<sup>153</sup> And separately the commission must find that there exists “significant support from the affected community” before it can authorize a camera installation.<sup>154</sup> Given the limited information available prior to this report about the CSC program’s potential deterrent effect, and the difficult task of gauging the affected community’s concern from comments expressed by individuals participating in the public hearings or otherwise making their opinions known, it is unclear how the Police Commission is to engage in the balancing objective advanced in the Ordinance. Not surprisingly, there is no evidence of efforts to quantify and/or weigh the concern of the affected community against the potential deterrent effects of the cameras.

While our research did not include a survey of the communities surrounding the cameras<sup>155</sup> to assess the level of knowledge about the CSC program, there is evidence that the public notice and hearing process have engaged the community to some extent—both the “affected community” as it is conceived under the Ordinance and the broader community including nongovernmental organizations

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<sup>149</sup> S.F., CAL., ADMIN. CODE § 19.5(b) (2008).

<sup>150</sup> For example, concerns about English-only signs placed in the Tenderloin district were raised at the November 15, 2006 Police Commission hearing.

<sup>151</sup> The signs now feature four languages: English, Chinese, Spanish, and Vietnamese.

<sup>152</sup> *Id.*

<sup>153</sup> S.F., CAL., ADMIN. CODE § 19.4(c) (2008).

<sup>154</sup> *Id.*

<sup>155</sup> While “affected community” is not defined in the Ordinance, the notice requirements that place signs proximate to the location to be surveilled and the list of individuals to be notified by mail if MOCJ so chooses, which includes “the owner of each property within 300 feet of the proposed camera location as reflected on the latest Citywide Assessor roll”; “neighborhood associations and organizations listed with the Planning Department as representing businesses, owners or occupants located within 300 feet of the proposed camera location”; and “to the extent practicable, the occupants of each property within 300 feet of the proposed camera location” all suggest that the affected community is meant to encompass those who live, work, or own property within 300 feet of a camera.

representing many constituencies and values<sup>156</sup>—in a dialogue about the CSC system. Both local community residents and members of organizations with issue expertise in several of the secondary objectives—for example policing practices and privacy—attended hearings about the CSC system, evidencing a level of sustained public engagement we have not found in other locales.<sup>157</sup> Judging from comments on the proposed CSC installations, recorded in the meeting minutes, individuals from the “affected community” appear to regularly participate and the conversations often focus specifically on the needs and concerns of the local population.<sup>158</sup>

As discussed in Chapter 1 and others, the Ordinance seeks to provide oversight over the development and effectiveness of the CSC system. The Ordinance provides a process and test to support front-end decision-making about the CSC program’s expansion. Equally important, the Ordinance includes reporting requirements intended to facilitate a review of the system’s effectiveness post-installation. The SFPD is required to prepare annual reports to both the Police Commission and the City’s Board of Supervisors on all CSC program cameras located in the City and County of San Francisco. These reports are to identify the camera locations, the crime statistics for the vicinity surrounding each camera before and after the camera is installed, crime statistics from surrounding vicinities, the number of times the Police Department requested copies of the recorded images, the number of times the images were used to bring criminal charges, the types of charges brought, and the results of the charges. The Police Commission may direct the removal of any individual camera(s) based upon information provided in these reports. This provision provides a substantial opportunity for an ongoing evaluation of the CSC program and strategy. Data generated by this report, the first under the Ordinance, and others provide information about the “potential” of both the current CSC program and other camera installations, those that exist and those that may be considered in the future, to deter crime. Such reports can aid in rationalizing the decisions about the program.

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<sup>156</sup> For example, a nonexhaustive list of organizations participating in Police Commission hearings about CSC program installations includes: Outer Mission Association; Mission Merchant’s Association; East Mission Improvement Association; American Civil Liberties Union of Northern California; Libertarian Party; Vietnamese Youth Development Center; Children’s Justice; Mission Neighborhood Resource Center; Save Our Streets; La Raza Centro Legal.

<sup>157</sup> Admittedly, San Franciscans are known for their civic engagement, so it is difficult to isolate what effect the Ordinance requirements had on the level of engagement per se, however the Ordinance created an ongoing forum for this discussion.

<sup>158</sup> Following the passage of the Ordinance, the Police Commission first considered the installation of new cameras on November 15, 2006. While the commission did approve the cameras at this meeting, the matter was reopened at the meeting of January 17, 2007, at which the commission entertained nearly three hours of public comment from nearly 100 people. Minutes of these meetings are available at <http://www.sfgov.org/site/uploadedfiles/police/commission/nov15mins.pdf> and <http://www.sfgov.org/site/uploadedfiles/police/commission/Meetings/minutes/2007/jan17mins.pdf>.

Once a CSC program installation is approved, the Ordinance requires CSC program cameras to be installed in an “open and obvious manner.”<sup>159</sup> This further facilitates community awareness of the CSC program. Currently each CSC program location has a minimum of two cameras; some have as many as five. All are posted at either a street intersection or a parking lot at a height of at least twenty feet. All are conspicuous, and one, located at 16<sup>th</sup> and Mission Streets, has a flashing blue light installed on top to draw attention to its presence. The majority are single-lens fixed-focus unidirectional cameras. The cameras’ recording directions are clearly ascertained by sight. However, the field of view of a particular camera can only be determined using knowledge of the type of sensor that the camera is using, the camera’s lens focal length, and the height at which the camera is mounted. None are located outside of the viewing range of a pedestrian.<sup>160</sup> A far smaller number have a 360-degree viewing range and are housed in opaque domes; it is impossible to determine by sight which way the lens points in these housings.

Signs at CSC program installation sites must provide notice in the languages that the City deems appropriate for the demographics of the specific camera site as directed by the Ordinance.<sup>161</sup> At least one multilingual sign (in English, Spanish, Vietnamese, and Chinese, with white text on a blue background) is posted at each location (some locations have multiple signs, including first-generation English-only signs<sup>162</sup>) with the text: “Notice—all activities at this location may be recorded” and an image of a video camera.<sup>163</sup> Newer signs also feature SFPD and City of San Francisco insignia in order to inform the public that the cameras are both City- and SFPD-controlled. Generally, the signs are posted at a height of fifteen to twenty feet on telephone or lighting poles; while this appears to keep the signs free of graffiti, it makes them more difficult to notice. Until and unless research is conducted it will remain unclear whether the sign placement—currently rather high—or the graphic and text design of the signs provides effective notice to individuals. However, the signs again raise the level of community knowledge about the program. Finally, as mentioned in Chapter 1, the SFPD is required to

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<sup>159</sup> S.F., CAL., ADMIN. CODE § 19.2(a) (2006).

<sup>160</sup> In contrast, several of the cameras deployed by the City of Los Angeles at the MacArthur Park site are located atop multiple-story buildings outside of the view of park visitors. There are signs in MacArthur Park stating that the area is under video surveillance, and there are cameras installed conspicuously within the park, but as many are on rooftops the public is likely unaware of the precise locations.

<sup>161</sup> Under the Ordinance it is the responsibility of MOCJ to determine the languages of the signs and develop a standardized format and oversee the production of the signs, but through our study we conclude that the city administrator has taken on the responsibility for meeting this set of obligations. S.F., CAL., ADMIN. CODE § 19.5(a)(2-3) (2008).

<sup>162</sup> Older signs are small, with black text on white background, and read: “NOTICE: All activities at this location may be recorded.” The signs provide no notice as to who owns or controls the cameras.

<sup>163</sup> Ironically, the image is of an older video camera, and not of a surveillance camera.



maintain and update a list of camera locations on its website. Both SPFD and DEM maintain a current list of CSC cameras on their respective websites along with a request form for obtaining camera footage for authorized requestors.<sup>164</sup>

Compared to other cities that have adopted surveillance cameras as part of a policing strategy, San Francisco has been more transparent<sup>165</sup> about its aims, its processes, the system itself, and with this report, its findings about the functioning of the CSC program.<sup>166</sup> The CSC Ordinance is one of the very few that governs a surveillance camera program in this country.<sup>167</sup> It is the only one that requires the concerns of the affected community to be balanced in decisions about whether to install cameras in specific places, or to require the support of the affected community for such an installation.<sup>168</sup> It provides both pre-installation notice to facilitate community participation in the decision of whether to install CSC program cameras, and post-installation notice (through the placement of cameras and signs) of the areas under surveillance. San Francisco is one of the first municipalities in the nation to conduct an outside evaluation of the system for distribution to the public and for use in making decisions about the future of the program, and it is the only city that has legally bound itself to conduct such a detailed study. The amount of information provided to the public about the CSC program through this report is unparalleled. It provides useful information to the City, “affected communities,” and the general public about the current system. However, additional information would further aid the City in its future deliberations about this program and other existing or contemplated surveillance camera systems.<sup>169</sup>

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<sup>164</sup> The SFPD web page is available at [http://www.sfgov.org/site/police\\_index.asp?id=93194](http://www.sfgov.org/site/police_index.asp?id=93194). The DEM web page is available at [http://www.sfgov.org/site/ecc\\_index.asp](http://www.sfgov.org/site/ecc_index.asp).

<sup>165</sup> It is important to note that this report examined the CSC program exclusively. Several other surveillance camera systems are used within the city of San Francisco, for example various building security systems, municipal transit cameras, etc.

<sup>166</sup> Many of the nonprofit organizations and scholars that have raised concerns about the proliferation of video surveillance cameras across the country have been specifically disturbed by the lack of public input to and regulation of the programs. See “Under the Watchful Eye: The Proliferation of Video Surveillance Systems in California,” Mark Schlosberg and Nicole A. Ozer (discussing lack of enforceable regulations and lack of policies guiding such systems in California, with the exception of San Francisco as of June 2006), *The California ACLU Affiliates*, Aug. 2007; and *Guidelines for Public Video Surveillance: A Guide to Protecting Communities and Preserving Civil Liberties* (recommending public oversight and accountability through “a detailed, participatory and transparent process” in which “members of the community that would be affected by a proposed system should have the opportunity to participate in the decision to create such a system, as well as the subsequent major decisions affecting its coverage and capabilities”) pp. 20-21, *The Constitution Project*, 2006.

<sup>167</sup> Washington, DC regulates the use of video surveillance by the Metropolitan Police Department. See “Metropolitan Police Department Video Surveillance Regulations Emergency Act,” passed in March 2002; codified as the Metropolitan Police Department Use of Closed Circuit Television, Chapter 25, Title 24 of the District of Columbia Municipal Regulations (Public Space and Safety) (2002).

<sup>168</sup> *Id.* Washington, DC requires that public notice of proposed camera installations be provided and the public be guaranteed thirty days to submit comments that the police chief must consider and then provide an explanation of the decision to install, or not install, cameras.

<sup>169</sup> For example, information about the response to the CSCs of “affected communities,” particularly witnesses, victims, and perpetrators; the experience of other cities with different camera installations, deployment strategies, and policies governing

## Accountability and Oversight

The Ordinance constrains the CSC program to the criminal context, limits police use of CSC program footage to investigations of specific crimes, and builds in processes to facilitate auditing. These provisions limit the SFPD's discretion to determine for itself how to best use the CSC program cameras and resulting footage in its efforts to address crime. Many decisions about the system as well as provisions of the Ordinance constrain the SFPD's use of the CSC program including: deploying an unmonitored system; housing CSC footage within a separate agency; limiting the rank of SFPD personnel who can make requests; and structuring an authorized sign-off process. Comments by Police Commissioner Petra DeJesus reflect this commitment to constrain the SFPD's use of the CSC program: "These cameras are not live viewings or anything like that. They are recording; they're limited on the footage, on the amount of area that they can cover, and that they're not accessible to anyone without a procedure that is set forth—almost—very close to a warrant. . . . There are some [privacy] safeguards that are put into the particular cameras."<sup>170</sup> Comments of a San Francisco resident explain the role these constraints played in building community support for the CSC program: "I'm cautiously supportive of these cameras on the condition that the rules about the ways that this information is used are airtight, are iron clad. [That footage] cannot be used, cannot be repurposed for anything other than the investigation of a crime after it's been committed."<sup>171</sup>

These design and policy choices limit police discretion over system use in two ways. First, the unmonitored system distributes responsibility for various aspects of the system across separate agencies, which limits the ability of the SFPD or individual police or SFPD units, alone or in concert with DTIS and/or MOCJ, to determine how to integrate the CSC program into broader policing practices and strategies. The constraints limit the potential for the sorts of misuse that have been documented for other

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system use; police, prosecution team, and defense counsel experiences with camera footage from other public and private camera systems in San Francisco or elsewhere; and comparative data about the cost of the CSC program, other programs in other cities, and alternative strategies that could be deployed with similar resources. While outside the scope of our report, this and other information could be invaluable to the City as it considers what to do with the current CSC program and considers other uses of video cameras in policing contexts.

<sup>170</sup> Remarks of Commissioner DeJesus, Police Commission hearing, April 4, 2007.

<sup>171</sup> Remarks of Derek Turner, Police Commission hearing, January 17, 2007.

camera systems in use by SFPD,<sup>172</sup> but these constraints also limit the SFPD's ability to iteratively identify how to integrate the CSC system into other policing initiatives. As discussed earlier, we found little evidence that the police were actively involved in initial decisions about the CSC pilot program or later additions to the system. Thus, the structure and policies governing the CSC program likely limited opportunities for misuse while also limiting the opportunity to explore other ways in which the CSC system could support policing. For example, the system cannot be used to identify crimes in progress and to strategically redeploy police based on real-time information, or to provide real-time support to police on the ground during chases, arrests, and other incidents. The ability to remotely view a particular area in real time also can assist police in deploying resources by providing up-to-date information about conditions on the ground. As discussed in Chapters 2 and 4, monitored CSCs do not in and of themselves lead to reductions in crime any more than unmonitored CSCs do. However, as we will discuss, it is possible that monitored systems, *if monitored by police familiar with an area* and integrated into other policing strategies, could provide additional leverage for policing activities beyond the investigatory use the system currently supports.

Second, placing the records at the DEM and instituting a formal written process to control and document release of the CSC program footage provides both front- and back-end checks on the use of the CSC system. One can imagine an unmonitored system, like the CSC program, without any limits on police access and use. Instead, SFPD use of the CSC program footage is constrained to investigating crimes after the fact. This too limits the possibility of using the CSC program in other contexts, for example as a vehicle for intelligence gathering or more generally understanding the patterns and activities in areas experiencing high crime rates. The Ordinance's structured process for procuring CSC footage ideally provides data for studies such as this one to understand the use of the CSC system, in addition to providing an audit trail to identify and address misuse. While there is no evidence that the SFPD has audited the use of the CSC program, the data generated provides information essential to this report<sup>173</sup> and a ready data set to support accountability and oversight by the department, the Police Commission, and others.

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<sup>172</sup> A SFPD officer working at the San Francisco International Airport in 2004 was suspended for nine months after he was found to have used San Francisco Airport surveillance cameras to "focus on women's breasts and buttocks." Confirmed by Airport police officer Ron Hill and reported by Jaxon Van Derbeken, "Officer accused of gawking at women; Internal charges say he used surveillance equipment at airport," *San Francisco Chronicle*, July 17, 2004. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2004/07/17/BAGP27N6M51.DTL&hw=san+francisco+police+officer+surveillance+camera+airport&n=019&sc=325>.

<sup>173</sup> The DEM does occasionally audit access by its employees; this is discussed in Chapter 4.

As discussed earlier, the standard process for requesting CSC footage may be a poor fit for SFPD and DEM resources. A line oft repeated to CITRIS researchers was: “You trust me with a gun and to use deadly force, but I can’t have a camera?” As we also have noted, several interviewees reported viewing footage at DEM.<sup>174</sup> According to DEM, when officers come in to view CSC program footage, DEM staff members log the request internally (including name of requestor, date, time, what footage/cameras were viewed).<sup>175</sup> DEM does not require a written request for such view-only access to the CSC program footage by appropriate SFPD personnel. In addition, DEM does not separately track access requests under the exigent circumstances exception. After viewing CSC program footage, if investigators identify footage they would like copied they typically make a verbal request and later deliver the required written request.

To the extent such viewing is not later documented by a written request and required authorization, it interferes with the ability to audit access and use of the system, and provide oversight and accountability with respect to CSC program use. Viewing, as opposed to obtaining a copy of footage, can occur more quickly and allow the investigators to substantially narrow the amount of footage requested from DEM, which in turn limits the impact of their request on DEM resources. As one SFPD investigator noted, " You make your request. You bring your request with you, and you go down to DEM, and you view it. And if it’s just not there, you’re not going to waste their time . . . that’s a time-oriented process for them. You’re not looking to make things hard for everybody. If it’s not useable, user friendly, it’s not going to get used either.” Somewhat paradoxically, viewing the footage at DEM—to the extent it limited the amount of footage requested or ruled out a request altogether because nothing relevant was found—may have protected the privacy of individuals captured on the footage. By previewing footage and eliminating requests for irrelevant footage, investigators also reduced the workload of SFPD supervisors. It appears that the controls on accessing copies of CSC footage, while important from the perspective of maintaining controls on discretion, conducting studies of system use, and facilitating oversight, could be better tailored to limit the use of SFPD and DEM staff and machine resources.<sup>176</sup> Due to the practice of some investigators—either preparing formal requests but not submitting them until after viewing footage to determine its relevance, or viewing footage prior to

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<sup>174</sup> As discussed earlier, it is unclear whether subsequent requests for footage were filed, as required under the Ordinance exception for exigent access.

<sup>175</sup> The log we received from DEM for all CSC footage requests from the program’s inception through mid-August 2008 contains the name of the department (not the SFPD personnel) making the request. Similarly, the name of a specific public defender placing a request was recorded in only one instance. In addition to date, time and camera location(s), the logs generally contain an incident report/case number and/or CAD number.

<sup>176</sup> Limitations on DEM resources are discussed later in this chapter.

preparing a formal request and subsequently neither preparing nor filing one (it is unclear whether this occurred exclusively or partially or exceptionally under the exigent circumstances exception)—some amount of CSC program use has fallen into a gray zone without complete documentation,<sup>177</sup> which limits the ability of the researchers to fully understand the system’s use and limits the effectiveness of the controls established under the Ordinance to control and oversee CSC program use.

As we have noted, there are alternative measures for controlling access to the system, and monitoring and auditing use of footage that may address the staffing, technical, and resource constraints faced by the SFPD and DEM. A recommendation is made in the preceding section. The broader question about possible changes to the system itself—for example, moving to real-time monitoring; using pan, tilt, and zoom cameras; deploying ShotSpotters or camera “intelligence” technologies—and how they interact with concerns about oversight and accountability, including constraining police discretion and recording system use, are discussed in Chapter 4.

### **Protection of Privacy and Related Rights**

As described in Chapter 1, the City sought to protect individual privacy and related rights as it deployed the CSC system. The Ordinance defines a Community Safety Camera as one that the City and County of San Francisco uses to film public streets, sidewalks, or common areas of public housing complexes.<sup>178</sup> Cameras can only record “areas perceptible to the human eye from public streets and sidewalks.”<sup>179</sup> That the Ordinance explicitly forbids the City from filming nonpublic spaces speaks to a perceived threat to citizens’ privacy if the cameras went unregulated. Additionally, if a camera’s view incidentally includes private places, such as residences, the City employs digital masking to block camera recording of those areas. The community participation ensured by the Ordinance<sup>180</sup> provides an opportunity for privacy concerns, among others, to be considered during debates about proposed CSC installations. Implicitly, this creates the possibility that concerns of the “affected community,” including privacy concerns, may in some instances outweigh the potential deterrent effect in the Police Commission’s assessment of whether or not to approve a proposed CSC installation.

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<sup>177</sup> DEM logs of “view-only” requests do not provide information about the specific crime being investigated or the exigent circumstances to the extent they motivated the access. In contrast, the form for requesting copies of footage developed for use under the Ordinance requires an incident case number or CAD number.

<sup>178</sup> S.F., CAL., ADMIN. CODE §19.2(a) (2008).

<sup>179</sup> S.F., CAL., ADMIN. CODE §19.3 (2008).

<sup>180</sup> S.F., CAL., ADMIN. CODE § 19.4(c) (2008).

Though the CSC footage is generally poor with respect to identifying individuals and may only record public areas “perceptible to the human eye,” the program nonetheless produces digital footage that can be accessed, analyzed, manipulated, and recontextualized according to the will and technological capabilities of whoever controls it. Thus, several provisions of the Ordinance as well as practices agreed upon by the Police Commission provide constraints on whom may receive copies of CSC footage, the purposes for which it may be copied, and its subsequent disclosure. Concerns over constraining access are reflected in comments of Police Commission President Sparks: “When we approved the cameras’ installation, there were two conditions to that. One was that the confidentiality of the film be kept . . .”<sup>181</sup> The 2008 amendments, as discussed previously, expanded the range of individuals who may obtain copies to include defense counsel. As the range of those who can access the footage increases, so does the risk of unauthorized disclosure, which could threaten the privacy interests of those recorded on the video. To guard against this, the Ordinance makes “[a]ny person who discloses a recording in violation of this Subsection” (i.e., defense counsel or those to whom they can disclose it) guilty of a misdemeanor punishable by up to a \$1,000 fine and/or up to six months in jail.<sup>182</sup> Supervisor Gerardo Sandoval during the debates around the adoption of the 2008 amendments said, “Let me also say, for those people who are primarily concerned with First Amendment rights and privacy, which was, after all, our original concern, that the Department, or the City of San Francisco cannot release these tapes to any other party without a court order. And I think that should assure people that we are protecting people’s First Amendment rights and their privacy.”<sup>183</sup> To protect against further dissemination of CSC footage, City Administrator Ed Lee told the Police Commission that he would request, on behalf of the mayor, his office, and the commission, that DEM not issue CSC footage (outside the specific procedures set out for defense counsel and SFPD) unless required to do so under a court order and after first obtaining a protective order to prohibit further release.<sup>184</sup>

Additional provisions evince concerns about privacy, likely overlapping with other values. For example, while many interviewees dismissed the concept that reasonable individuals might have concerns related to privacy when in public places, the policy of DEM is that the CSC footage is exempt from disclosure under both the California Public Records Act and the San Francisco Sunshine

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<sup>181</sup> Commissioner Teresa Sparks, Police Commission hearing, February 6, 2008.

<sup>182</sup> S.F., CAL., ADMIN. CODE §19.3(b) (2008). It is unclear why the penalty provision applies only to defense counsel.

<sup>183</sup> Supervisor Gerardo Sandoval, Board of Supervisors hearing, February 26, 2008.

<sup>184</sup> Police Commission hearing, April 4, 2008. We do not know whether this is current practice.

Ordinance.<sup>185</sup> And as discussed in Chapter 1, the Police Commission conditioned approval of additional cameras for the CSC system on the stipulation that the CSCs be turned off by DTIS during political demonstration requiring a permit. It was reported during a February 6, 2008 Police Commission meeting that up until that date the system had not been turned off during permitted protests—apparently due to a lack of process—and City Administrator Edwin Lee told the Police Commission, “Going forward, . . . we are recommending a process in which the SFPD can communicate directly with [DTIS]. On permitted, pre-planned events, those cameras will be turned off immediately from here on, on all known events.”<sup>186</sup> When the DEM receives a request from SFPD field operations, DEM forwards the request to DTIS, which DTIS then acknowledges and acts on by turning off the CSC program cameras.

The Ordinance limits the retention of CSC program footage to thirty days, in contrast to other California cities such as San Luis Obispo and Palm Springs that have adopted policies calling for all records derived from routine video monitoring to be retained for as long as required by federal or state law. The Ordinance establishes provisions to control and oversee access and use of the CSC system that protect the privacy of individuals in the recorded footage. DEM developed a form to facilitate requests for copies of CSC footage that reinforces the Ordinance by requiring SFPD requesters to provide an incident number along with their name and signature and the name and signature of the captain or deputy chief of inspectors approving the request; and for the requester to “*declare under penalty of perjury that I am member of the San Francisco Police Department at the rank of Inspector or higher, and am authorized under San Francisco Administrative Code Chapter 19 to receive community safety camera recordings from the DEM.*” This form assists in implementing the Ordinance. Other than SFPD bulletins describing the system generally and the camera locations, there were no specific policies or procedures promulgated in the SFPD to guide the use of CSC program footage once it is obtained.<sup>187</sup> In interviews SFPD personnel said that the CSC footage was covered by general guidelines about how to handle investigatory materials. No training was provided about how to view and manage the footage, which we discuss in more detail later in Chapter 4. No guidance was given on how much footage to request before and after the occurrence of a crime.

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<sup>185</sup> At [http://www.sfgov.org/site/ecd\\_index.asp](http://www.sfgov.org/site/ecd_index.asp). See Department of Emergency Management Policy No. 6.01.05, Release of Public Records, p. 2, Section VI A5., “Community safety camera footage is exempt from disclosure under San Francisco Administrative Code Chapter 19” (May 29, 2008). Available at <http://www.sfgov.org/site/uploadedfiles/ecd/Release%20of%20Public%20Records%20Policies%20and%20Procedures.pdf>. As described in footnote 138 no court has considered this question.

<sup>186</sup> Testimony at Police Commission hearing, February 6, 2008.

<sup>187</sup> SFPD Bulletin 05-164 and 07-174.

Cities including Fresno, California, and Washington, DC have developed policies that establish the use of an auditable trail of system use and access in order to detect misuse, and others including Baltimore have established policies that call for disciplinary action for deliberate improper or unlawful monitoring. The audits of system use are an essential component of these cities' controls. The District of Columbia Office of Professional Responsibility conducts audits of the system four times a year. In Fresno, the police department and a majority of the city council must agree upon an auditor, and the ideal auditor is considered to be a retired federal judge.<sup>188</sup>

More detailed policies and procedures would assist San Francisco's efforts to maintain checks on the use of the CSC program and footage. Such policies and procedures would enhance the ability to meet the secondary objectives of the CSC program by providing more detailed direction and guidance to the various departments involved. An example of where detailed policies would have assisted with implementation of City policy was presented during a Police Commission hearing. As discussed above, it came to light that a year after the MOCJ and the Board of Supervisors agreed that CSC cameras would be turned off during permitted demonstrations there still was no process in place to operationalize this commitment. As we noted earlier in this section, in February 2008 City Administrator Ed Lee stated that a process would be put into place onward to coordinate camera shutoffs between SFPD, DEM, and DTIS, and the research team verified with DTIS that this process is in place. The lack of consistent management of the CSC program likely contributed to the failure to develop procedures to implement the initial agreement between MOCJ and the Board of Supervisors. The multiple agencies and entities involved in the CSC program create an even greater need for clear direction and management and documented practices and procedures to guide use.

While there are gaps in documentation and limited guidance about CSC program use, there are some general SFPD mechanisms and policies that inform police interactions with the program and handling of the footage, and a general understanding among interviewees of the privacy and other concerns expressed during public hearings. For example, even in the absence of more comprehensive policies and practices, our interviews revealed a great degree of sensitivity to privacy concerns. In the words of one inspector, "So in my mind, knowing my city, nobody has told me that I have to keep it narrow but I don't want to have to justify somewhere down the line in a court of law or have somebody jumping down my throat. Why did I request two hours when the incident took place in fifteen minutes? It just makes my life easier and I just know the politics in this city so was I told I couldn't have a

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<sup>188</sup> We do not know the intervals at which such audits are conducted.



broader time period? No, but I know the sentiment and the atmosphere. Everybody's got rights except the police." While gaps exist, existing policies and the mindset of the police appear to provide day-to-day support for privacy.

DEM has put policies and procedures in place, such as the forms for requesting access, and the requirement that DEM custodians authenticate themselves to the computer system prior to exporting footage. In addition, restricted access to both the DEM building and the computers used to export footage provides an additional layer of physical security for the CSC program footage.

Relative to other locales, San Francisco has adopted a strong framework to govern the installation and use of the CSC system. The limitations on footage use, access, and retention, along with the public process and overall limitations on the purposes for which CSC program cameras may be installed and used, are consistent, although not comprehensively so, with guidelines to govern police use of video surveillance systems developed by a range of privacy experts.<sup>189</sup> However, additional training and guidance on specific issues such as how much footage to request during an investigation and how to use the footage-viewer software should be provided. In some instances, the lack of documentation and training limits the extent to which CSC program users' actions are guided by the need to protect privacy and other interests. Translating policies into systems and practices that can support them is an important part of implementation. While interviewees seemed personally vested in limiting possible privacy concerns and other issues that could raise public concerns about the CSC program—regardless of whether they thought such considerations were legitimate—additional guidance and training would assist them in doing so.

Accordingly, we present recommendations for program management and training in Chapter 4.

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<sup>189</sup> For example, see Office of the Privacy Commissioner of Canada, *Guidelines for the Use of Video Surveillance of Public Places by Police and Law Enforcement Authorities*, March 2006. Available at [http://www.privcom.gc.ca/information/guide/vs\\_060301\\_e.asp](http://www.privcom.gc.ca/information/guide/vs_060301_e.asp); The Constitution Project: *Guidelines for Public Video Surveillance: A Guide To Protecting Communities and Preserving Civil Liberties*, 2006. Available at <http://www.constitutionproject.org/libertyandsecurity/article.cfm?messageID=310&categoryId=6>; Electronic Privacy Information Center, *Proposed Privacy Conditions for Video Surveillance* (January 15, 2008), available at [http://epic.org/privacy/surveillance/epic\\_cctv\\_011508.pdf](http://epic.org/privacy/surveillance/epic_cctv_011508.pdf); Government of British Columbia (Canada), *Privacy Guidelines for Use of Video Surveillance Technology by Public Bodies* (2004). Available at [http://www.lcs.gov.bc.ca/privacyaccess/main/video\\_security.htm](http://www.lcs.gov.bc.ca/privacyaccess/main/video_security.htm); Information & Privacy Commissioner of Ontario (Canada), *Guidelines for Using Video Surveillance Cameras in Public Places* (revised September 2007), available at [http://www.ipc.on.ca/images/Resources/up-video\\_e.pdf](http://www.ipc.on.ca/images/Resources/up-video_e.pdf); Office of the Information & Privacy Commissioner for British Columbia (Canada), *Public Surveillance System Privacy Guidelines* (January 26, 2001), available at [http://www.oipcbc.org/advice/VID-SURV\(2006\).pdf](http://www.oipcbc.org/advice/VID-SURV(2006).pdf).

## Chapter 4: Evaluation of the Overall Performance of the CSC Program

In this chapter we focus on issues that affect the overall performance of the CSC program, specifically its ability to meet the City of San Francisco's objectives.

### CSC Program Management

According to a 2005 U.K. Home Office evaluation of thirteen closed circuit television (CCTV) programs, “three key team characteristics determined whether the CCTV systems were designed to meet their objectives: access to appropriate technical expertise, full engagement of end-users, [and the] suitability of [the] project manager.”<sup>190</sup> This finding echoes similar comprehensive studies of CCTV systems, identifying managerial aspects as crucial components in determining why some CCTV systems appear to succeed in their objectives and others fail. Unfortunately, this is one area in which San Francisco's CSC program suffered dramatically from a lack of clear organization and management, arguably affecting the efficacy of the system. In this section we will discuss the impact the pilot status of the program had on its management, as well as the impact of the lack of a project manager.

The Ordinance names four agencies with responsibilities for the CSC : MOCJ, SFPD, DEM, and DTIS. Specific duties associated with maintenance and records keeping are delegated to DEM and DTIS. The director of MOCJ is tasked with making an initial determination about whether to recommend a CSC program camera installation, and where such a determination is made, the director is responsible for providing a recommendation and supporting documentation to the Police Commission. In addition, the director of MOCJ is responsible for the overall effort to notify the public of a proposed CSC program camera installation.<sup>191</sup> However, the Ordinance does not explicitly place MOCJ or another entity in charge of managing the CSC program. For example, in Section 19.4(a), the Ordinance states that “If the Director of the Mayor's Office of Criminal Justice (“MOCJ”) finds that a particular location

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<sup>190</sup> Gill, Martin and Spriggs, Angela. Home Office Research Study 292: Assessing the Impact of CCTV. United Kingdom Home Office Research, Development and Statistics Directorate, February 2005. Accessed September 4, 2008 at <http://www.homeoffice.gov.uk/rds/cctv2.html>.

<sup>191</sup> S.F., CAL., ADMIN. CODE § 19.5(a) (2008). DTIS is responsible for placing signs, however the director of MOCJ is ultimately responsible for the design, languages, and number of signs. In addition the director may at his/her discretion decide to provide mailed notices as provided under the Ordinance, § 19.5(b).

is experiencing substantial crime and that the potential to deter criminal activity outweighs any concerns asserted by the affected community, the Director may recommend approval of a new community safety camera in that location to the Police Commission.” While clearly this implies that the MOCJ director is empowered to make substantive decisions about the CSC program, the Ordinance does not explicitly name MOCJ as the body that is primarily responsible for the program. The lack of overall program management has limited its ability to meet its objectives.

It is important to remember that while the City could address the technical deficiencies of the CSC program and ensure the cameras are producing footage that is extremely clear, without addressing the management and sociotechnical issues we have identified the program may still fail to produce effective results. The authors of this report are aware of numerous firsthand and anecdotal examples of police departments around the United States where departments have purchased state-of-the-art, sophisticated equipment, but have been unable to effectively deploy their systems because, among other reasons, their employees lack technical experience and comprehension of the system. Accordingly, we strongly encourage the City to address the scope of issues we identify here.

### **Pilot Status of the Program**

In 2005, the CSC program began as what might be described as a “true” experimental pilot—two cameras installed at two locations in the Western Addition in September 2005.<sup>192</sup> While the notion of a pilot for a technology project is not poorly conceived—prototyping, for instance, is a normal part of the technology development process—what is clear about the CSC program is that it was expanded from the original two cameras to seventy-one as of April 2008 without any formal recognition that the program had grown to a full-scale technology project and was no longer a small-scale experiment.<sup>193</sup> This growth, combined with the failure to run the program with the resources and attention a program of its size requires, is a key failure in the CSC management process.

One notable problem with this approach was the project’s pilot status prevented DTIS, which oversaw the installation of the Community Safety Cameras, from mapping out a growth plan for the project’s infrastructure, including hardware requirements and network architecture. According to interviews with DTIS staff, the system’s growth was ad-hoc and reactive—not an optimal means for managing technology infrastructure. Said one DTIS employee, “Whether we deploy three systems or

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<sup>192</sup> San Francisco Police Department, Bulletin 05-164, September 12, 2005. According to the Police Commission, there were another thirty-one cameras installed prior to the Ordinance taking effect.

<sup>193</sup> The Police Commission still considers the CSC project to be a pilot pending the conclusion of this report.

300 systems, there's a huge impact to us . . . if we're just going to do [a pilot], we're not going to sit down and usurp a whole lot of architecture time."<sup>194</sup> While operating without such plans in place may have been appropriate for a short-term proof of concept, the CSC program should not have been allowed to expand to its current size without a clear assessment of hardware, network, and funding limitations. The lack of program leadership and management left DTIS without adequate information to make such assessments.

*Lack of a Project Manager, Failure to Solicit End-User Requirements, and Feedback*

*"Is there one entity in the system responsible for the whole program? It sounds like there is not. There's a lot of different pieces, so there's really no one [who] can take responsibility for the whole program. . . . Would MOCJ be the agency that one would say had oversight of the whole program from beginning to end?"*

—Police Commissioner Teresa Sparks, Commission Hearing, February 6, 2008

The most significant management gap in the CSC program is the lack of a project manager. Although Mayor Gavin Newsom and his Office of Criminal Justice [MOCJ] initiated the program, frequent turnover at MOCJ since the program's inception in 2005 has led to a leadership vacuum that in several instances has been filled by other City departments. Most notably, City Administrator Edwin Lee has attempted to act as a primary contact for the CSC program, calling a semi-regular stakeholders' meeting among key CSC constituents. Since Judge Kevin Ryan became the head of MOCJ in January 2008, Lee has stepped back from this role. However, it is not clear that MOCJ has as of yet identified a single point of contact within its office for all CSC program issues. As one interviewee, who has been working on the program since it started, stated: "I really don't know who the top person in charge is of the camera program. I suspect it's Kevin Ryan at MOCJ, but people don't know."

The lack of a project manager for the CSC program is worrisome in many respects. Because this project involves at least four City departments directly (MOCJ, SFPD, DEM, DTIS), identifying a single person or department that holds the ownership of the program and can act as a coordinator for all CSC issues is crucial for ensuring that problems are identified and lines of communication remain open. This deficiency became clear in the majority of the interviews we conducted; as the previous quote notes, subjects from all departments were unclear as to who actually managed the program,<sup>195</sup> and most had no

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<sup>194</sup> CITRIS interview with DTIS staff.

<sup>195</sup> Most users guessed that MOCJ was the owner of the project but had no idea who to contact with questions or problems.

idea who they would contact in the event of a problem. Because most of the users of the system have little or no understanding of its technical aspects, having no clear point of contact means any technical issues that hamper system usage or efficiency go unreported and unsolved. For example, several police officers we interviewed stated that they didn't know whom to contact if an individual camera was out of service or required adjustment.

The lack of management meant no one was responsible for identifying the potential users of the system or for gathering and documenting user needs. In particular, SFPD investigators, conceptualized as the system's primary users, were not approached to discuss requirements for the CSC program or to determine how the program would fit into the SFPD's investigatory process. Said one SFPD inspector, "Any technology is going to be ineffective if it doesn't have enthusiastic leadership championing it. To the extent that the end users are the police department it's unfortunate they weren't major partners in the design and implementation . . . particularly if the approach is not in line with the general thoughts of how it should [work]. I don't know of any police department or officer who would tell you to just put up a camera, don't monitor it, and walk away and hope that it captures a crime so we can go look at the footage later and potentially solve your crime. No one, no department would believe in that approach."

DTIS acted as the technical integrator for this project. Interviews with DTIS employees and SFPD officers confirmed that SFPD officers *did* meet with DTIS to review proposed camera sites, recording angles, and field of view, but not about technical requirements for the footage to be useful in criminal investigations. Says one SFPD officer, "Basically, we tried to maximize the effectiveness of the cameras. They can't be moved and they can't be monitored. So, we kind of said, 'Where do these guys hang out the most?' If we had ten shootings where did the majority of them occur? And we tried angling the cameras to pick up all the areas." However, DTIS never received any specific user requirements mandating that recorded images should capture a sufficient level of detail at specific recording distances to identify individual humans or details such as license plate numbers. Such requirements would have allowed DTIS to calibrate recording quality and distance in accordance with existing storage space and budget, and to advise MOCJ and the Police Commission on the trade-offs between quality and optimal number of cameras.

If CSC program users had been consulted on system requirements, their need for CSC program footage of a quality to support the identification of individuals and captured details such as vehicle license plates would have been identified and addressed. The inadequate quality of the footage is the number-one complaint expressed by interview subjects. Generally, images captured by the CSCs are of

insufficient resolution to decipher faces or license plate numbers unless an image is captured at very short range. As one SFPD officer described, “Everything’s fuzzy. [You’ll] get a color [of a] car, car description, how many people did the crime, what kind of gun they may have used . . . but you won’t pick up a face, it’ll be blacked out or whited out, the plates will be blurry, you can’t even pick up a street sign most of the time.” As DTIS chief Richard Robinson stated before the Police Commission in February 2008, “DTIS is just the technical custodian, so we install the cameras, we go to make sure that the lenses are clean, that they’re working, that the computer systems are actually capturing the data. But as far as getting feedback to the quality and how it appears when the police are asking for information or giving video to someone under a request, there’s not a lot of feedback process.”<sup>196</sup>

Because DTIS never received user requirements or other requirements integral to the success of a technical project, such as project goals, growth estimates, storage requirements, etc., DTIS responded to additional program expansion requests in an ad-hoc manner. The lack of opportunity for DTIS to engage in long-term CSC system planning, in particular with regard to hardware requirements and network architecture (and given the myriad of other technical projects DTIS must accommodate across the City) negatively impacted the design and growth of the CSC program.

Historically, to the best of our knowledge MOCJ has not had staff with in-depth technology expertise. MOCJ focuses on obtaining grants and administering criminal justice programs with few technical components. We understand the CSC program to be its first foray into technology-driven policing. As one interviewee stated, “We have things like the camera project and ShotSpotter and these other technology oriented projects, but [MOCJ does not] have any sort of technology expertise or staff . . . it’s hard to have someone sponsor a project without any direct ability on their own to delve a little bit into the technology itself.” Programs in Chicago and Los Angeles, in contrast, have dedicated managers, including technology specialists; smaller cities typically assign at least one police officer as a project manager to oversee all aspects of a surveillance camera program and to represent department interests to outside integrators and vendors. It appears likely that MOCJ staff were unaware of the technical complexities involved with managing the CSC program, particularly as the program grew beyond its small pilot status into a major undertaking.

The lack of familiarity with the complexity of technical projects, combined with the leadership turnover and lack of a clear management structure, negatively impacted the development of the CSC program. The lack of a project manager continues to threaten to undermine the program’s efficacy

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<sup>196</sup> DTIS Chief Information Officer Richard Robinson, San Francisco Police Commission Hearing, February 6, 2008.

today; without a strong project leader with clear management responsibilities, the CSC program will continue to operate without a clear feedback cycle, and will continue to shortchange the needs of its users.

### CSC Program Technical Architecture

In this section we give a brief overview of the physical and technical architecture of the CSC program: the cameras, network components, and back-end systems. This information was accumulated through interviews with various Department of Technology and Information Services employees, an analysis of documents provided by DTIS, and site visits to each of the camera locations (with the exception of the Coit Tower location). We also obtained comparative data by conducting site visits with the cities of Chicago and Los Angeles. We present an overview of the challenges presented by the current technology. We conclude with suggestions for improvements to the technical aspects of the program.



Figure 3-4: CSC Notice on Jones St. in the Tenderloin district

### *Physical Overview of the CSC System*

The City of San Francisco's seventy-one Community Safety Cameras are dispersed throughout twenty-five high-crime areas of the City (with the exception of the cameras placed at Pioneer Park at Coit Tower)<sup>197</sup>. At least one multilingual sign (in English, Spanish, Vietnamese, and Chinese, with white text on a blue background) is posted at each location (some locations have multiple signs, including first-generation English-only signs<sup>198</sup>) with the text: "Notice—all activities at this location may be recorded" and an image of a video camera.<sup>199</sup> Newer signs also feature SFPD and City of San Francisco insignia in order to inform the public that the cameras are both City- and SFPD-controlled. Generally, the signs are posted at a height of fifteen to twenty feet on telephone or lighting poles; while this appears to keep the signs free of graffiti, it makes them more difficult to notice.

Each location has a minimum of two cameras; some have as many as five. All are posted at either a street intersection or a parking lot at a height of at least twenty feet. All are conspicuous, and one, located at 16<sup>th</sup> and Mission Streets, has a flashing blue light installed on top to draw attention to its presence. The majority are single-lens fixed-focus unidirectional cameras. The cameras' recording directions are clearly ascertained by sight. However, the field of view of a particular camera can only be determined from knowledge of the type of sensor that the camera is using, the camera's lens focal length, and the height at which it is mounted. None are located outside of the viewing range of a pedestrian; in contrast, several of the cameras deployed by the City of Los Angeles at their MacArthur Park site are located atop multiple-story buildings outside of the view of park visitors.<sup>200</sup> A far smaller number have a 360-degree viewing range and are housed in opaque domes; it is impossible to determine by sight which way the lens points in these housings. The cameras are typically aimed to record a combination of the intersection and adjoining sidewalk areas; recording radius depends upon camera model and precise placement. These details as well as a complete technical overview of the existing system are discussed in Appendix 2.

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<sup>197</sup> Interview with DTIS staff.

<sup>198</sup> Older signs are small, with black text on a white background, and read: "NOTICE: All activities at this location may be recorded." The signs provide no notice as to who owns or controls the cameras.

<sup>199</sup> Ironically, the image is of an older video camera, and not of a surveillance camera.

<sup>200</sup> There are signs in MacArthur Park stating that the area is under video surveillance and there are cameras installed conspicuously within the park, but as we note many are on rooftops and the public is likely unaware of the precise locations.





Figure 3-5: Newer CSC notice (blue sign) and an original notice (black-and-white sign) at 3rd St. site

### Technical Problems with the CSC System

*“We know what the cameras are capable of—they’re capable of a much higher frame rate. However, we’re hamstrung a bit by our ability to store data, and that’s just a constraint of the budget we were given as part of a pilot project.”*

—DTIS Chief Richard Robinson, Meeting of the San Francisco Police Commission, February 6, 2008.

### *System Architecture and Hardware*

Multiple news articles, reports, and parties directly involved with the San Francisco CSC program have reported that there are numerous technical problems with the current CSC system. These problems include: incapacitation of individual cameras (due to malicious attacks or hardware failures); slow frame rates for the archived data; and the inability to identify human beings with the cameras.<sup>201 202 203 204 205</sup>

<sup>201</sup> Bulwa, Demian. “Newsom wants to add 25 cameras,” *San Francisco Chronicle*, October 5, 2007. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/10/05/MNR7SK0VL.DTL&hw=Newsom+wants+to+add+25+cameras&sn=001&sc=1000>.

<sup>206</sup> <sup>207</sup> <sup>208</sup> The technical problems of this kind decrease the overall performance of the CSC program. Even within the constraints of the existing hardware and system architecture, the program could be modified to ameliorate the failings identified in this report. In the following section we analyze the CSC program's shortcomings and discuss strategies for improving performance.

A recurring problem is the prolonged incapacitation of cameras due to malicious attacks and/or hardware failures. Just prior to the release of this report, six of the seventy-one cameras were nonoperational for multiple months.<sup>209</sup> The cause of the camera failures varied; one was shot with a gun, two were shot with a paintball gun, one was pulled down using a rope lasso attached to a car, and the hardware failed in two of the IPIX 360° cameras. Although it is difficult to prevent attacks on cameras, we will discuss the use of housings that could help mitigate the potential effects of such attacks.

Not immediately repairing incapacitated cameras has consequences. An obvious one is the inability to collect video footage of possible criminal activity in the area where an incapacitated camera is deployed. However, other, unintended consequences exist. We noted that the signage at these camera sites continues to declare their presence and recording function although the cameras are no longer operating. The presence of the signs, when the cameras are not functioning, may create a false sense of security for residents and bystanders in the public space that these individuals assume is being monitored by the cameras. Furthermore, delays in repairs could send a message to residents and bystanders that the City is tolerant of such vandalism acts and that the CSCs are not particularly important.

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<sup>202</sup> Bulwa, Demian. "San Francisco security cameras' choppy video," *San Francisco Chronicle*, January 28, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/01/28/MN37TKH6O.DTL&hw=San+Francisco+security+cameras+choppy+video&sn=001&sc=1000>.

<sup>203</sup> Bulwa, D. and Stannard, M. "Focus on Security Cameras: Is it worth the cost?" *San Francisco Chronicle*, August 17, 2007. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/08/17/MNU0RJUQ7.DTL&hw=Security+Camera+Is+it+worth+the+cost&sn=001&sc=1000>.

<sup>204</sup> Métier, P. and Ross, A. "S. F. crime cameras to stay up for now." *San Francisco Chronicle*, July 14, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/07/14/BA4F11O1KE.DTL>.

<sup>205</sup> Knight, Heather. "Crime cameras not capturing many crimes," *San Francisco Chronicle*, March 21, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2008/03/21/MN27VNFET.DTL>.

<sup>206</sup> Schlosberg, M. and Ozer, N. (2007). *Under the Watchful Eye: The Proliferation of Video Surveillance Systems in California*. San Francisco: American Civil Liberties Union.

<sup>207</sup> Cameron, A., Kolodinski, E., May, H., and Williams, N. "(2008). Measuring the Effects of Video Surveillance on Crime in Los Angeles. *California Research Bureau*. CRB -08-007, p. 12. Retrieved on May 5 and August 3, 2008, [www.library.ca.gov/crb/08/08-007.pdf](http://www.library.ca.gov/crb/08/08-007.pdf).

<sup>208</sup> Interview with DTIS staff.

<sup>209</sup> The replacement or repair of these cameras was scheduled to take place during the week of June 29-2008.

The CSCs that experienced hardware failures were both IPIX 360° cameras. DTIS stated that they were unable to fix these two cameras promptly because of insufficient technical support for this camera model. To mitigate the effects of future failures, we suggest that DTIS be provided a budget for the maintenance and repair of each camera type in the CSC system.<sup>210 211</sup>

Another common complaint about the CSC system is the low image quality, which limits the ability of investigators and other legitimate users to make positive identifications of suspects, witnesses, and victims. Unfortunately, in the current CSC system, there is no stated requirement that the system be capable of human identification. As a result, the objectives that the archived video data should serve post-collection are unclear. Technical requirements for human-identification capabilities for the system were never formally gathered, as discussed earlier. If a human-identification requirement were made, it would put particular constraints on the resolution, placement, and fields of views of the cameras; however, it would give a clear purpose for the use of archived video data that is collected. In the next section we will discuss a few of the constraints that need to be met in order to allow the City's CSC system to collect video data in which humans can be positively identified by end users.

While the robustness of the cameras can be moderately improved (e.g., by purchasing cameras that are less likely to fail), the bulk of the complaints lodged about system performance could be more simply addressed through improvements to the back-end capacity and the CSC system network in the CSC system. Insufficient storage capacity is a major factor in multiple problems associated with the CSC system—in particular, losses in the rate of video footage that is stored as well as losses in the resolution at which video can be stored. The CSC program currently in use has maximum possible frame rates ranging from 10 to 12 frames per second (FPS) as output post local processing and JPEG compression. However, the frame rates currently used by DTIS are in the range of 2–4 FPS. Therefore, there is at least a 60 percent loss in efficiency within the system. This loss is due predominantly to the insufficient amounts of storage that is available for 10–12 FPS at the highest resolutions. The slower 2–4 FPS rate causes multiple gaps in time and motion in the video. Due to the insufficient storage there is too little space to store video data unless it is highly compressed, further reducing quality. . Furthermore, the insufficient storage does not allow for a less lossy compression technique<sup>212</sup> to be used (so that less resolution is lost during compression). This leads to stored video footage that is not as sharp

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<sup>210</sup>At <http://www.ipix.com>, visited August 26, 2008.

<sup>211</sup>To the best of our knowledge, IPIX cameras appear to be available for purchase online through the IPIX manufacturer's website.

<sup>212</sup>*Lossy* refers to the amount of data (and hence image quality) that is lost when the video stream is compressed (shrunk) from its full recording resolution in order to minimize storage space.

as is possible for the system. As we will discuss, improving the CSC system storage capacity and the video footage rate, when video is stored,<sup>213</sup> will address these problems.

Unreliable or low-bandwidth wired or wireless network links between components in the CSC system (e.g. between a camera and a network switch/router) can also cause inefficiencies in system performance and can lead to the capture of inferior video data. Specifically, if these links are error prone or have very low capacity, they can cause dropped frames, thereby reducing the effective frame rate of the video archived at the base station server. As we will discuss in Chapter 4, improving the type and capacity of the network links will help to address these problems.

### **Lack of Data Analytics and Technology Infrastructure at SFPD**

*“You could have all the technology in the world, but if you can’t share it, and you don’t have enough people to act on it, it just sits in a big box and goes nowhere. So cameras are great, but if the city were blanketed with cameras you would have all these faucets, spigots spewing data at you, [and] unless you have a big bucket to carry it, to capture this data . . . and have someone catching those data trickles and doing something with them, it’s useless. Cameras should be worked like any other information source. It has to be part of a broader integrated system.”*

—SFPD Inspector

Many large U.S. cities that deploy camera systems do so in an environment where crime data can be both easily shared and analyzed; in both Chicago and Los Angeles, sophisticated police technology infrastructure allows surveillance cameras to be integrated into each department’s strategic approach to fighting crime. The Chicago Police Department has access to easy-to-use integrated software tools with large comprehensive databases.<sup>214</sup> These tools not only enable the police to perform real-time camera monitoring, but at the same time also allow authorized police officers to view city maps of the location, placement, field of view, and operational status of the cameras on the maps, criminal activity and "hot-spot" statistics by location, past incident reports, and suspect mug shots, all in real time. Although Los Angeles’s camera system currently is not as integrated into the city’s technological infrastructure, the LAPD implementation of COMPSTAT crime analytical tools allows for detailed and real-time analysis

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<sup>213</sup> Interview with DTIS staff.

<sup>214</sup> Specifically, the Citizen and Law Enforcement Analysis and Reporting (CLEAR) system combined with the Genetec Omnivision system.

of crime trends, which in turn allow for a detailed assessment of camera system efficacy.<sup>215</sup> With sophisticated crime analytics capabilities, these cities are able to perform continuous analysis of the effectiveness of their crime-fighting strategies, including CSC performance, and to integrate their camera programs into their tactical applications.

In contrast, the SFPD's technology infrastructure and management is outdated. The department only recently created a Chief Information Officer role; prior to that, officers with limited or no technology experience were rotated through a technology command position every three years. While the creation of a permanent civilian CIO position is a positive development, the SFPD still faces significant obstacles. Current MOCJ Director Kevin Ryan has publicly expressed his support for SFPD technology overhaul as a top priority for MOCJ, as has Supervisor Ross Mirkarimi, who chairs the Public Safety Committee.<sup>216</sup> A detailed analysis of the SFPD's technology infrastructure is outside of the scope of this report, although the CITRIS team did interview the SFPD's former CIO to ascertain the general state of technological support and resources in the context of maintenance or expansion of the CSC program. From that interview, we were able to confirm that the department's information infrastructure was nearly twenty years out of date and that SFPD had many basic technology infrastructure problems to address before it would be possible to integrate any of the technological aspects of the CSC program. According to one interviewee, "the Police Department couldn't support [the CSC program] if they tried, because we can't support our own stuff now, so how are we going to support this newer technology? There's too many things we've got to fix first."

Should the primary goal of the CSC program continue to be to deter and investigate crime, the importance of integrated crime analytics capabilities cannot be overestimated. While SFPD is certainly capable of producing crime statistics, the department's analytics capabilities appear to be limited; as MOCJ Director Kevin Ryan stated to the *San Francisco Chronicle* earlier this year, "The city of Boston has twelve crime analysts—we have one."<sup>217</sup> Should San Francisco wish to move away from a forensic camera system to an actively monitored system, for example, this lack of analytic capability will be detrimental.<sup>218</sup> Furthermore, the SFPD's general technical obsolescence presents a barrier to deploying a more technically sophisticated system, whether it be live monitored or not. Without a well-coordinated

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<sup>215</sup> The City of Los Angeles posts its current crime statistics online at [http://lapdonline.org/crime\\_maps\\_and\\_compstat](http://lapdonline.org/crime_maps_and_compstat). Real-time crime maps are also available.

<sup>216</sup> Nevius, C. W. "S. F. Crime Cleanup Boss Wants Better Tech." *San Francisco Chronicle*, April 29, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/04/29/BA2P10DBQF.DTL&hw=Kevin+Ryan+outdated&sn=001&sc=1000>.

<sup>217</sup> Id.

<sup>218</sup> The issue of active monitoring will be discussed in depth in the final chapter of this report.

and managed technical infrastructure, the integration of a more complex CSC program will likely occur in isolation and remain constrained by limited abilities to share incident data with other departments or coordinate data from various programs. This is especially relevant if, for example, the City wishes to integrate its ShotSpotter gunshot detection technology with a camera system.

### **Issues Related to Integrating People and Process with the Technology**

The video footage captured by the CSC program is only as good as the end user's—in this case, DEM employees'—ability to retrieve and access it. Our research revealed several technical issues that affect DEM employees' ability to perform their job duties, and, unless addressed, put future development of the CSC program at risk.

CSC program footage is searched, identified, retrieved, and copied to DVD-recording media for distribution to authorized requestors by staff of the Custodian of Records division of the Department of Emergency Management. Staff members include both permanent and temporary employees with basic computer familiarity; several members of the Records staff were previously 911 dispatchers who have experience using the department's Computer Aided Dispatch system (both for dispatch and records management). At present, footage is retrieved by DEM staff using a single on-site computer authorized for this purpose; users are required to authenticate themselves before using the system, and login attempts are logged.<sup>219</sup> The on-site system is a significant improvement over past processes that required staff to travel off site to the DTIS radio shop in the Bayview area to complete a retrieval request; at some point, CSC servers were configured to allow DEM employees to remotely access CSC servers from the DEM office. This represented an improvement not just in the time lost to travel, but also because burning footage to DVD proceeds at a 2:1 pace; one hour of footage requires two hours of recording time (it is unclear how much time downloading from the server adds to this process, but staff note that the connection is slow). Indeed, even with the on-site access the time required to burn footage was a primary complaint of DEM staff. Because the process can fail (and often does; the process is extremely error prone) at any point during the transfer, it requires the user to pay close attention during the burn process in order to ensure success.

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<sup>219</sup> There does not appear to be a process in place to conduct a regular, systematic audit of access logs. According to the DEM, occasional audits are conducted.

In addition, DEM staff must time burn processes carefully, because the system is set to purge old data every four hours during every twenty-four hour period, and DVD burning cannot proceed at those times. Purging appears to take approximately ten minutes to complete. While apparently two requests (each for a single camera) can be processed simultaneously, the availability of a single computer with a single DVD burner limits capacity to only one staff member working at a time, and only one DVD can be produced at a time. Furthermore, for requests that ask for footage from multiple cameras at a single location, recordings must be located and burned for each camera separately.

While a formal training program does not exist, DTIS developed documentation for DEM users to follow when connecting to the server and downloading video files. The DEM issued a set of standard operating procedures to its staff in 2005<sup>220</sup> that describe the procedures for authorizing release of the video records and to whom, but with no instructions on how to retrieve the records. To the best of our knowledge, however, it does not appear that any formal requirements were gathered to assess the needs of or impact on DEM staff during the program's development. The existing process in place is time consuming, but appears workable with the current level of requests. However, it does not appear to be scalable. Since the pilot program began in 2005, the number of requests has steadily increased each year, and the 2008 Ordinance changes that allow the public defender, private investigators, and criminal defense attorneys to request footage are increasing the number of requests by approximately 50 percent, according to DEM. If the City adds additional cameras, it would be inadvisable to do so without assessing the impact on DEM staff, and at minimum purchasing additional equipment to allow multiple requests to be processed simultaneously. Substantial improvements or changes to the CSC program require a complete restructuring of the end-user component of the system, including a specific requirements-gathering phase to ensure users' needs are met.

### **Lack of Documentation and Training for SFPD and Others**

While DEM staff received documentation describing how to copy and burn CSC footage, training and documentation describing how to view video footage burned to DVD discs was not provided to SFPD officers, the DA's office, or public defenders. SFPD officers initially were issued a bulletin informing

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<sup>220</sup> San Francisco Emergency Communications Department Standard Operating Procedures, Number 905. Effective July 27 2005, revised December 10, 2005.

them of the existence of the first set of cameras in 2005<sup>221</sup>, and an updated bulletin was issued in 2007<sup>222</sup> with a comprehensive list of camera locations current as of August 6, 2007. Both bulletins briefly describe the procedures for obtaining footage, but discuss no guidelines for use or give any specific instructions for viewing footage. We do not know whether the DA's office or defense counsel organizations, such as the public defender's office, provided formal notices or guidance about the system to users.

While the SFPD memos we obtained outlined required procedures, they do not provide clear instructions on how to access and interpret CSC video footage. For example, users are not advised about computer and operating system requirements for the player software; until the SFPD recently completed upgrading its computers from Windows 95 to Windows XP, many officers could only view the footage on a few machines in the department because Windows 95 did not support the video software. Placing the burden of deciphering how to use the CSC system on its users can reduce use or leave users unaware of critical features, such as the digital zoom capability of the footage software.

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<sup>221</sup> SFPD Bulletin 05-164

<sup>222</sup> SFPD Bulletin 07-174



## Chapter 5: Recommendations and Conclusion



Figure 4-1: Community Safety Cameras and notice at Haight St. and Webster St. site

### Introduction

A review of the press reports and Police Commission hearings from over the duration of this now three-year-old project reveals the extent to which the CSC program has been an ongoing source of discussion, revealing a City government and community grappling with both the promises and problems of implementing a modern solution to the age-old problem of crime. San Francisco's commitment to engaging in public discussions about the CSC program is admirable; other U.S. cities have lacked a

comparable degree of transparency about their video surveillance systems. The commissioning of this report, which goes far beyond the reporting required under the Ordinance, is perhaps the high-water mark manifesting the City's ongoing commitment to evaluate the utility of the CSC program and provide data and analysis to support decisions about the program's future.

Our evaluation reveals the City's willingness to experiment with a system that incorporated safeguards to protect many of the values that fuel the intense debates about surveillance and civil liberties, and to undertake a serious evaluation to assess the CSC program's merits. Unfortunately, the assessment at this time, in many respects, is not promising. The CSC program has not met one of its primary objectives, deterring violent crime, and as discussed previously, and in Appendix 1, we believe there are good reasons, both theoretical and experimental, to be skeptical that the program, even with modifications, can deter violent crime. In contrast, the CSC program has substantially deterred a class of property crimes. While the City clearly hoped to deter violent crime, the significant effect on property crime may provide a basis for rethinking and reorienting the CSC program to maximize its effectiveness in this area. The program evidences partial success with respect to its second primary objective of facilitating investigations and prosecutions. Our research noted substantial limitations with the program's utility for investigations and prosecutions, some of which can be addressed by the City through changes to technology and policies and practices (*i.e.*, image quality and process for reviewing footage), others of which present open research questions (*i.e.*, what effect do CSC program cameras have on witnesses), and are outside the City's control (*i.e.*, hats and hooded sweatshirts worn to frustrate identification). Improvements in these areas require management, resources, and planning that the CSC program currently lacks.

In this chapter we provide recommendations, guidance, and strategies for the City's key decision-makers to consider as they determine whether and how to alter the Community Safety Camera program in light of our findings. We hope this study fulfills its purpose under the Ordinance by assisting the City in making fact-driven decisions about the CSC program.

## **Implications of Our Findings and Recommendations**

### *CSC Program and Deterring Violent Crime*

In formalizing the CSC program, the City sought to limit it to "locations experiencing substantial crime and where the potential to deter criminal activity outweighs any concerns asserted by the affected

community as determined by the Police Commission.” The findings of our report bear directly on the second prong of the Ordinance’s test, “the potential to deter criminal activity.” To date, camera locations have targeted areas of violent crime. A core finding of our report is that the Community Safety Cameras have had no impact on violent crime in receiving neighborhoods and that neither the level nor the spatial distribution of homicide is impacted by the Community Safety Cameras. This does not mean that a system configured and operated differently could not have some effect on violent crime; however, based on our research there is little basis for a belief that the CSC program, as currently configured, has the “potential to deter *[violent]* criminal activity.”

To the extent that the City chooses to deploy the CSC program primarily as a tool for deterring violent criminal activity, the test set out in the Ordinance requires the program be revisited. We have reservations, based on existing research and theory, about the potential for a program such this to deter violent crime. As discussed in Chapter 2, violent crimes are often committed outside the bounds of rational behavior, and in relation to other crimes they are rare events, meaning there are simply fewer of them to deter. While other factors have affected the CSC system’s overall performance, the fact remains that a forensic, reactive system will likely never have the desired effect of deterring violent crime at a significant level. While we do not foreclose the possibility that the CSC program in a new configuration, in combination with other policing strategies, and integrated more thoughtfully into the daily work of policing might reduce or displace violent crime, existing research offers little support that such a system can be designed to guarantee results and little insight into what such a system would look like.<sup>223</sup>

For this reason, if the City chooses to continue to explore the use of the CSC program to deter or reduce violent crime, we recommend that it do so in a manner that will allow for a controlled evaluation to measure the effects. In practice, this would mean rolling out specific programs with varied approaches, carefully controlling the application of both the “treatment” and any possible intervening factors, and evaluating each within a specific time period to determine whether the revisions in that particular deployment showed evidence of reducing or deterring violent crime. While it is impossible to

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<sup>223</sup> The Urban Institute is in the midst of a multicity study of video surveillance as deployed in Chicago, Baltimore, and Hyattsville, Maryland. This report will provide information about the experiences of other cities deploying camera systems as part of their policing efforts. Like this study, it is certain to provide insight to San Francisco about camera deployments aimed at violent crime. It “will be documenting the decision-making processes behind cameras, what people hope to gain from camera implementation and use, and certainly look at the impact, as well.” Remarks of Nancy La Vigne, Urban Institute, Department Of Homeland Security Privacy Office Public Workshop, CCTV: Developing Privacy Best Practices, Monday, December 17, 2007. Available at [http://www.dhs.gov/xlibrary/assets/privacy/privacy\\_workshop\\_cctv\\_Transcript\\_Law%20Enforcement\\_Perspectives\\_Panel.pdf](http://www.dhs.gov/xlibrary/assets/privacy/privacy_workshop_cctv_Transcript_Law%20Enforcement_Perspectives_Panel.pdf).

perform completely controlled studies outside the laboratory, it is possible to control for many variables in the site selection and study design and thereby increase the strength of the conclusions that can be drawn from program analysis on the back end. Through such studies the City may identify successful strategies for deploying the CSC program in the context of its policing strategies toward reducing violent crime.

### *CSC Program and Property Crime*

We found fairly consistent evidence across a myriad of empirical tests that the installation of Community Safety Cameras at nineteen locations throughout the City has had a statistically significant and substantial impact on property crimes within the areas in the Community Safety Cameras' view. The declines in property crime are in excess of 20 percent, and for crimes occurring in public, as high as 30 percent. The entire impact of the Community Safety Cameras on property crime rates is occurring through an impact on larceny theft. Included in this broad crime category are such crimes as pickpocketing, purse-snatching, theft from buildings, and thefts from automobiles (though not automobile theft).

To the extent the City chooses to deploy the CSC program for the purpose of reducing property crimes, our research supports a conclusion that it has a high "potential to deter criminal activity" aimed at property. While we note that this was not the purpose for which the CSC program was established, the City could decide that under the Ordinance test it is a legitimate reason to continue the program and deploy additional cameras. Given these findings, if the City chooses to reorient the CSC program toward property crime, it should consider altering camera placement to maximize the system's potential. For example, current camera placement is driven by violent crime. It may be that redeploying cameras to areas with higher property crime rates may prove yet more effective.

### *CSC Program as an Investigatory and Prosecutorial Tool*

The success of the CSC program as an investigatory and prosecutorial tool (this includes not only assisting in prosecution, but also, equally important, assisting in the correct identification of those to be prosecuted and exonerating those who should not) has been limited, but not insignificant. All stakeholders interviewed spoke of instances where the program assisted them in their role within the criminal justice system. Many of the limitations on the system's utility in this context arise from the

failure at the outset to identify and work with stakeholders to generate a set of system requirements that should have guided the technical and procedural components of the CSC system. We will provide specific recommendations to address problems identified during our research that impaired the functionality of the CSC program as an investigatory and prosecutorial system.

There was evidence that DTIS, which runs the technical infrastructure for the CSC system, has in limited cases throughout this project worked with some end users to refine the system based on user feedback. This gives us some hope that future technical changes will be better aligned with the users' needs and objectives the system is intended to support. However, the CSC program continues to lack real leadership and an appropriate institutional home. Regardless of how the City chooses to proceed, this CSC program needs a home, a leader, and a clear management structure. To be fully functional this program must support objectives that stretch from the street to the courtroom, and it must support users across several parts of the criminal justice system. The program requires substantial coordination and management. We commend City Administrator Edwin Lee for his efforts to shepherd this program through a rather complicated policy and administrative environment and to spearhead the effort to commission this report. In our estimation, he and his staff deserve the City's gratitude for his work, including his commitment to facilitating this research. The CSC program, however, must be overseen by an individual and housed in an institution involved more directly with the City's criminal justice programs—particularly its policing strategies—and with access to the technical expertise that a technology-based project of this scope requires.

### **Recommendations for the Existing CSC System**

Our recommendations rest on several assumptions, namely: that the City sees value in a forensic investigatory tool for SFPD and others; and/or the City finds there is value in the deterring the type of property crimes, as opposed to violent crimes, our research found the CSC system effects; if this remains the strategic model the City is committed to, then this report should identify the critical issues that, if addressed, would facilitate improvements aimed at meeting these objectives.

To that end, the recommendations to follow provide guidance on how to improve the CSC program as a tool for deterring property crime and/or supporting investigations and prosecutions. In sum, if the technical and policy recommendations we make are followed, we would expect the CSC

video image quality to improve and be on par with the quality other cities are experiencing. If the management and leadership vacuum is filled, within whatever strategic model the City wishes to follow, the program should be better able to meet its objectives and address the needs of its user base. Should the City wish to change the design and goals of the program, we would argue that these recommendations would still be required as they reflect deficiencies that must be addressed in the successful administration of any technical project, as well as issues specific to video data capture.

However, even with these recommendations in place, the City must be clear-eyed about the limitations to the current strategic approach and honest with residents about those limitations, as community members often clamor for cameras without understanding both their inherent limitations as well as programmatic constraint (such as the fact that the CSCs are not actively monitored). For example, adding additional cameras to existing sites, or to new locations around the City, may increase the investigatory power of the program, but it appears unlikely to alter the program's effect on violent crime.

#### *Use of CSC Footage as an Investigatory Tool*

As we discovered, the SFPD investigators at times view footage in person at DEM prior to determining whether to submit a written request. If the investigator concludes the footage is unhelpful he or she may not file a written request at all. Often, but not exclusively, this process is used in time-sensitive situations to aid in an investigation. Viewing footage to identify its relevance reduces the workload on both SFPD and DEM. The absence of a structured process for reviewing CSC footage to determine its relevance and utility prior to requesting a copy likely leads to more footage being copied than is necessary. This is unfortunate, because copying CSC footage taxes city resources and creates copies outside the control of DEM that can be lost, transferred, and disclosed, which presents privacy risks. Furthermore, the lack of process fails to address a legitimate need and creates use that is untracked and unquantifiable both from an auditability perspective as well as in terms of impact on DEM resources.

- **Recommendation:** The Ordinance should be amended to clarify that all access to footage—viewing, copying, or other—requires supporting documentation to verify that it comports with the purpose limitations on the use of footage. The Ordinance should be further amended to provide a structured process through which SFPD investigators can access specific footage to determine its utility prior to requesting a copy. However, the City may want to limit the

requirement for supervisory authorization to situations where copies of footage are requested. This would allow investigators to assess the utility of CSC program footage by viewing it without seeking supervisor approval, thereby limiting the administrative burden on both DEM and SFPD when footage is determined to be irrelevant.

- **Recommendation:** The 2008 amendments extended the retention period for all CSC program footage, ostensibly to ensure that footage remained available until defense counsel had the opportunity to request it. The across-the-board increase in the retention period for CSC program footage is not feasible given the current resources of DEM. In addition, given the relatively limited footage that has been requested over the past years, the bulk of the footage being retained is unlikely to ever be requested. Yet retaining the footage creates the opportunity for it to be accessed inappropriately or misused. We recommend that the City convene a working group to consider alternative means of addressing defense counsel needs, privacy concerns, and system constraints. For example, the group could consider whether it is feasible to develop a process for retaining CSC program footage related to crime reports for thirty days but allowing other footage to be discarded more quickly. Ideally such a system could be coordinated and automated, limiting the need for DEM to manually download and copy footage.

#### *Inclusion of Community in Deliberation Process*

Community participation in the CSC program deliberations is one of the program's strengths. Providing information about this report and other studies of video surveillance systems in relation to crime prevention strategies would assist the community, especially the "affected community," in developing opinions about the CSC program. In addition to information about video surveillance systems and crime strategies, the deliberations about the program would be strengthened by information about the cost of the system in relation to other interventions.

- **Recommendation:** Identify strategies for raising the level of community understanding about the strengths and limits of the CSC system in order to support a more informed discussion of the CSC program, including distributing this report to the public, and providing clear documentation of any research considered or strategic analyses performed by MOCJ or

others. Provide information that facilitates comparisons between the investments in the CSC program and other alternative strategies.

### *Forensic Video Recommendations*

Regarding the general use of the CSC system for investigations, if CSC footage is to be used as forensic evidence, it must be treated like all other types of evidence gathered and produced by the SFPD and the prosecution team. We suggest other measures as follows.

- **Recommendation:** Ensure that the CSC program processes, policies, and technical choices follow the guidelines and best practices set forth by the Law Enforcement and Emergency Services Video Association (LEVA)<sup>224</sup> where practically possible.
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- **Recommendation:** Solicit feedback *specifically* from the SFPD forensic video investigator regarding any changes to the system as well as any future changes made as a result of this report.

### *CSC Program Management*

Unless a substantial commitment is made to oversee management the CSC program, we would advise the City to discontinue it. Similarly, we would strongly advise against expanding the CSC program without first addressing the management challenges it faces.

- **Recommendation:** Pinpoint the agency or department responsible for owning and managing the CSC program. As we noted in the Executive Summary, placing the CSC program within the SFPD would likely yield a greater degree of integration into other policing strategies and practices, with potential benefits, than keeping it within the primary purview of MOCJ. However, there are also limitations with placing the CSC program within SFPD, as it would require investing in technical and administrative systems to support it. However, placing it within SFPD could have ramifications for defense counsel access and other policy issues. Regardless, a project manager should be appointed who has sufficient management experience as well as experience in coordinating efforts between multiple stakeholders. Ideally this person would have some experience and familiarity with

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<sup>224</sup> LEVA's guidelines and best practices for acquisition of digital multimedia evidence and forensic analysis are available at [www.leva.org](http://www.leva.org).



technical systems. The project manager should be the single point of contact for all CSC program-related issues. All CSC program users should be made aware of the project manager's role and responsibilities and be provided with contact information.

- **Recommendation:** If the CSC project manager does not have technical experience, the managing agency or department must identify a corresponding technical lead (likely at DTIS) who can act as a single point of contact for the CSC project manager on all technical issues with the CSC system.
- **Recommendation:** The project manager should identify the key stakeholders in other City departments and ensure they or their designates attend Stakeholder Meetings. Assume responsibility for CSC Stakeholder Meetings and conduct on a regular basis.
- **Recommendation:** Conduct a review of the existing technical and procedural infrastructure, establish a user requirements group to build upon and refine the process of targeting and addressing requirements instituted in this report.<sup>225</sup> Convene stakeholders to develop and refine system requirements. In need of specific attention is the process for defense counsel access. As discussed previously the current system raises a host of complicated questions about how the CSC system relates to the standard criminal justice processes. The ambiguities and anomalies of the system should be clarified to limit their impact on system resources.

### *Technical Issues*

The existing system can be improved by increasing the system storage capacity (and increasing stored video footage frame rate and post-compression resolution to allow the collected footage to have fewer gaps in time as well as sharper images); mitigating the effects of vandalism on the cameras; and understanding the effect of any system expansion on the SFPD's data analysis and infrastructure capacities. Furthermore, CSC program security and the privacy of monitored individuals should remain important considerations when improving or redesigning the current system. We propose specific technical improvements for the current system and discuss their benefits as follows.

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<sup>225</sup> Due to the scope of this study, we are only able to outline the most pressing issues our research uncovered and were unable to probe all user, business, and technology requirements in depth. Additional inquiry will be required to fully capture requirements.

- **Recommendation:** Increasing storage capacity at DEM would increase the frame rate of stored CSC program footage, thereby improving its quality, and would provide DEM with the ability to store footage for the thirty-day period required under the Ordinance.<sup>226</sup> It might also improve the efficiency for downloading footage.
- **Recommendation:** We propose using differentiated rates of storage so that the longer a segment of video has been archived, the lower is the rate at which it is stored (e.g., two-day-old footage would be stored at full FPS, three- to seven-day-old footage stored at half-rate, eight- to thirty-day-old footage at a very low rate). This suggestion, working under the assumption that most requests for CSC image data occur soon after the commission of a crime, would potentially lead to an increased data retention time of archived data at the base station server. Furthermore, this recommendation, if implemented, would allow recently acquired, full-resolution video to be stored at a higher rate than the 3–4 FPS currently used (i.e., a rate closer to the 10–12 FPS maximum that the deployed cameras are capable of achieving at full resolution). This recommendation does not require an increase in storage capacity prior to its implementation<sup>227</sup>.
- **Recommendation:** Examine the interference in wireless channels, which could lead to a high bit-error rate and multiple dropped frames, and ensure that the City is using automatic repeat request (ARQ) protocols with TCP instead of UDP. The City should use wired links (if possible) in locations where wireless interference is high or in areas where the City requires a high frame rate. Because wireless links have a lower bandwidth than their wired counterparts, this suggestion, if implemented, could improve the quality of the video that is stored at the base station server in terms of an increased frame rate for the archived video data. It is because of the advantages of wired links over wireless links that DTIS has recommended that wired links be used between networked components in the camera system.
- **Recommendation:** Use JPEG 2000 rather than JPEG with the Discrete Cosine Transform. JPEG 2000 uses efficient discrete wavelet transform techniques. This standard allows for graceful

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<sup>226</sup> Interview with DTIS staff.

<sup>227</sup> Id.

degradation of image quality with lower rate transmissions, and encodes multiple layers of resolution. Using JPEG 2000 rather than JPEG would improve the image quality<sup>228</sup>.

- **Recommendation:** If link capacity is severely limited in a particular area, it is recommended that the JPEG compression ratio be increased. If implemented, this suggestion would allow video quality to be improved. Although increasing the JPEG compression ratio results in a greater percentage of image data loss, the resulting amount of data per image will be smaller. If capacity is limited in a particular area, the smaller data size will allow for data to be transmitted at a lower rate, therefore potentially decreasing the dropped frame rate.

- **Recommendation:** Use camera housings that are rated specifically for outdoor use, for the environmental conditions experienced in San Francisco, and resistant to acts of vandalism. For example, the housing should be constructed of solid aluminum alloys or heavy-grade steel. The viewing window on the housing can be made gunfire-resistant using LEXAN, a brand of plastic polycarbonate. In general, the camera housings should be of a high National Electrical Manufacturer Association (NEMA) rating and/or a high IP International Protection rating<sup>229 230</sup>. The highest quality of protection from environmental conditions is associated with high NEMA and IP International Protection ratings.<sup>231232233</sup> Currently, San Francisco uses Videolarm ACH13HBWM camera housings,<sup>234</sup> which are made of .08” extruded aluminum, have polycarbonate viewing windows of unspecified thickness, and can fit camera/lens combinations that are up to 10.5” long and 3.6” wide. The cost of each of the housings, which include a heater and a blower, is \$165. We compare these with other housings currently available. Pelco EH2515 IP66 rated camera housings with LEXAN viewing windows, a 15W heater, and which can fit camera/lens combinations 12.25” long and 2.75” wide cost \$170 each. Bullet-proof Videolarm BMT10 outdoor housing with a heater,

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<sup>228</sup> See, for example, <http://www.codiacstudios.com/jpeg2000-vs-jpeg.aspx>.

<sup>229</sup> Tse, Adrian. (November 2007) *Surveillance Designed to Weather the Storm*. ISC365. Available at [http://www.isc365.com/75\\_727.aspx](http://www.isc365.com/75_727.aspx).

<sup>230</sup> To See or not to See. Super Circuits Website. Available at [http://www.supercircuits.com/news\\_events.aspx?NewsID=22](http://www.supercircuits.com/news_events.aspx?NewsID=22) (Accessed July 1, 2007).

<sup>231</sup> See [http://www.ezscreen.com/ip\\_ratings.htm](http://www.ezscreen.com/ip_ratings.htm).

<sup>232</sup> See [http://www.ezscreen.com/ip\\_ratings.htm](http://www.ezscreen.com/ip_ratings.htm).

<sup>233</sup> See [http://www.ezscreen.com/ip\\_ratings.htm](http://www.ezscreen.com/ip_ratings.htm).

<sup>234</sup> See <http://esentia.com/getDocument.php?id=151>.

which have bullet-proof LEXAN viewing windows, 7-gauge steel tubing that is .23” thick, and can accommodate camera/lens combinations of up to 9.5” long and 3.25” wide cost around \$880 each.

- **Recommendation:** Ensure that adequate light is present in the locations where the cameras are placed. On average, at least 200 Lux is necessary to capture decent-quality video during the day (although image quality is not guaranteed to be good based only on amount of light received). Too much light can also cause severe degradation in captured-video quality. Background colors in the captured frame also affect video quality; for instance, if the camera is positioned to view a light-colored wall, the images of people that are captured (who walk by the wall) will be very dark. DTIS staff should evaluate whether or not the cameras avoid direct sunlight or direct light during all hours of daytime operation (direct sunlight can severely degrade quality, but it can also degrade the camera equipment over prolonged exposure). Furthermore, DTIS staff should ensure that there is a sufficient light available to the cameras in nighttime operation.
- **Recommendation:** Use a low-capacity Digital Video Recorder (DVR) technology locally at each camera location to always have video footage available, to prevent against loss of footage in case of network failure. DVR use would prevent the loss of any footage in the case of the network malfunctioning or dropping frames. The cost of implementing this suggestion will depend on the capacity of the DVR chosen. A low-capacity DVR will reduce cost and also limit the duration that video can be archived locally.
- **Recommendation:** Should the City wish to expand the existing CSC program, a realistic and detailed assessment should be performed in order to determine potential impact on SFPD technology infrastructure and how an expanded program would fit with the SFPD’s strategic technology goals.
- **Recommendation:** An assessment should be performed to determine how the SFPD’s existing data analytics capabilities could work (or not) with any planned expansion or redirection of the CSC program. This should include an analysis of both the crime type and incident data that would be appropriate to share with an analytics-based camera system to inform strategic deployment goals. It would also be beneficial to identify the type of data a camera system could return to a centralized crime data repository to better inform data analysis.

### *Technical End-User Recommendations*

In addition to the identification of the process and feature needs of users such as DAs, defense counsel, and SFPD investigators, an investigation of the needs of the system's technical users must also be included. What follows are specific recommendations we gleaned from our investigation; these recommendations should not preclude more in-depth requirements gathering from technical end-users.

- **Recommendation:** Increase the efficiency and reliability of the download and DVD burn process for DEM staff. While this recommendation is likely impossible without a commensurate increase in storage capacity, whether or not the City decides to add additional cameras, at a minimum an additional workstation and DVD burner should be purchased for DEM staff. Additionally, the connection between the remote server and access points should be optimized to reduce or eliminate the burn errors that repeatedly disrupt the process.
- **Recommendation:** Engage in an in-depth evaluation of existing processes and perform requirements gathering with DEM staff. While the existing process is not broken precisely, as noted it is not scalable if volumes continue to increase or if the City decides to expand or change the CSC program. An evaluation of changes or increased volumes and their impacts on DEM staff must be conducted to ensure staffing levels are appropriate, in particular if request load increases to the point of devoting a staff member to the position full time.

### *Policies, Procedures, Training, and Documentation Recommendations*

One considerable deficiency with the existing program is the lack of written policies and procedures, training materials, and general documentation across the board. We offer these specific recommendations:

- **Recommendation:** Develop policies, practices, and training materials to assist in implementing the Ordinance and optimizing use of the CSC system resources. Policy and practices guidelines are necessary to provide guidance on how to use the system both generally and in a manner consistent with the Ordinance. One such practice would be mandatory auditing of copy and view requests to

ensure compliance; ideally technology would be leveraged to manage both the handling of requests and the audits.

- **Recommendation:** The CSC project manager should create documentation and training materials describing how to access CSC footage using the proprietary software viewer for all CSC users. Documentation should be posted in a central location for each audience, and/or included on each DVD burned for easy reference.
- **Recommendation:** Training materials should provide details about software player features, and also brief users about any special considerations to be aware of when using video evidence for investigations. SFPD investigators should be briefed on the best practices of the use of video evidence as published by the Law Enforcement and Emergency Services Video Association.<sup>235</sup>

### **Considering Other Technological Approaches**

Depending upon San Francisco's priorities and finances, there are other technological approaches that the City could consider to enhance the passive framework of the current program, or to change the direction of the system by introducing active monitoring or other features. Modifications or wholesale changes in approach require a reevaluation of the goals of the program to ascertain if the approach continues to support the goals of providing forensic evidence to investigators and deterring crime<sup>236</sup>. In this section, we give general recommendations for each of these two strategic approaches. However, we must note as we have throughout this report, based on existing research there is no guarantee that these recommendations will succeed, due to both the inherent limitations to video surveillance as well as a system's dependence upon multiple contextual factors that can contribute to its success or failure. As such, if the City chooses to take a different approach, we would advise that it do so cautiously, taking an evidence-based approach that allows for clear measurement and assessment of the system's goals and results.

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<sup>235</sup> Guidelines can be located at LEVA.org.

<sup>236</sup> As noted earlier, most existing evaluations provide mixed or no support for the use of video surveillance to specifically target violent crime. Any change in technology will necessitate a discussion about the City's crime deterrence goals and an evaluation of how the change may or may not support those goals.

### *Enhancing a Passive System*

Should San Francisco wish to continue using a passive surveillance system, where the cameras are not monitored in real time, the City could consider deploying “triggered” surveillance techniques that utilize computer algorithms to detect different types of events. One example of this type of surveillance utilizes gunshot detectors in conjunction with surveillance cameras. This technique allows for CSCs to record and/or report only surveillance footage of a particular area where a gunshot is detected, and could be used with both an unmonitored or monitored system. This solution could also capitalize on the City’s existing investment in ShotSpotter gunshot detection technology. However, camera placement is obviously a critical issue for the success of this approach, as it requires cameras to be placed in areas with a high concentration of gun-related crime.

Another example is automatic threat identification. This solution uses cameras in conjunction with advanced analysis software (i.e., software that uses machine vision techniques) to automatically identify a potential threat and to report and store video footage of the area where the threat is detected. As an example, system designers could program the cameras to only report/store video footage when the detection software indicates that a firearm is being brandished by an individual in the area where the camera is deployed.<sup>237</sup> By limiting recorded video to incidents automatically detected by the software, such techniques help to preserve the privacy of law-abiding citizens that would otherwise be in the constant purview of the cameras’ gaze. Should the City continue to use unmonitored cameras, these solutions could be employed to flag certain recordings for review; in a monitored system, these types of detection techniques can alert a camera operator to a situation of potential concern. Again, success depends upon effective placement of the cameras.

Strategies such as these could also be used to build a limited monitored system, where instead of watching an area and attempting to proactively detect criminal activity, the City would adopt a set of technologies such as the ones we have outlined, in combination with reports from officers in the field, to use video surveillance to react to detected threats and calls for service. Like every approach, these strategies have their limitations; namely, software-based detection is not foolproof and may be incapable of detecting some threats or may not be very robust. As mentioned, a system that uses a combination of gunshot detection software and cameras will likely be limited by the inability to place enough cameras in enough places to detect every gunshot, though placement could be driven by an analysis of gunshot detection reports, and the City could use mobile units to allow for placement flexibility. In sum,

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<sup>237</sup> See <http://www.videoanalytics.info/research-medusa.html>.

technical innovations such as these could extend the usefulness of a unmonitored system or a limited monitored system to attempt to identify specific threats while avoiding a system in which the public is constantly under active surveillance. However, we again must caution that much of this technology is fairly new and largely unproven, and its effectiveness is not a given; much will still depend upon the context in which it is deployed.

#### *Active Approach—Real-Time Monitored Video Surveillance*

During this research, nearly every subject we interviewed mentioned live monitoring of video surveillance cameras in some context; typically, interviewees assumed that if the SFPD monitored the cameras the CSC system would be far more effective. Generally, assumptions that live monitoring will dramatically improve the CSC program were not based on concrete evidence.<sup>238</sup> The vast majority of evaluation research, conducted on monitored systems, offers evidence that monitoring surveillance cameras will not guarantee effectiveness in deterring crime. In this section, we will discuss the benefits and limitations of monitoring—and the related resource allocations it requires—and make an extremely specific and qualified recommendation for the City to consider should it wish to pursue a live monitored system.

It is certainly true that the majority of publicly owned surveillance systems in both the United States and Europe are monitored, to some degree, in real time, often by police officers, but sometimes by civilian employees (often retired police officers) or security guards under subcontract with the municipality. These systems typically use pan-tilt-zoom cameras that can be controlled by an individual person; usually, a monitor is expected to watch multiple cameras at once.<sup>239</sup> The assumption behind these systems is that the monitor will be able to spot a crime in progress or note suspicious activity and deploy resources accordingly, with the expectation being that crime can be proactively deterred, specifically through the short feedback loop between the triggering event and the deployment of police to the scene.

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<sup>238</sup> “Major academic books on CCTV have shown the ambivalence of its employment. While mostly advocates and critics believe that visual surveillance technology works, these studies explain that CCTV has to be seen in broader social and political contexts and that every optimistic belief in the effectiveness of technology is pure fantasy.” Hempel, Leon and Topfer, Eric. *Urbaneye: CCTV in Europe. Final Report*. August 2004, pg. 17. Available at [http://www.urbaneye.net/results/ue\\_wp15.pdf](http://www.urbaneye.net/results/ue_wp15.pdf).

<sup>239</sup> The numbers here vary greatly, but there is a body of human-computer interaction research that has studied both the maximum level of screens an individual can watch at one time and the length of time he or she can watch and still remain effective. Several research studies suggest that the maximum amount of time a monitor can actively watch a video stream and remain effective varies between thirty minutes to two hours.



The majority of public video surveillance evaluation research to date was conducted on actively monitored systems, and thus the key conclusions mentioned previously in this report remain applicable: that public video surveillance is most effective with respect to property crimes, and has had mixed to no effect on violent crime. Actively monitored surveillance is not a panacea; as we know from London, arguably the most surveilled city on the planet, crime has not disappeared despite the incredible number of monitored camera systems. Figures released in 2007 claim that despite the ubiquity of video surveillance, London police continued to have poor crime clearance rates; video evidence was not enabling them to solve more crimes.<sup>240</sup> Many factors contribute to these mixed results; as discussed in Chapter 4, the effectiveness of video surveillance systems depends as much on the contextual factors (characteristics of the area under surveillance, management of the system, employee training, and general program goals) as the technology—the addition of live monitors behind the cameras do not eliminate these factors, and in fact they present new complications. For example, the ratio of cameras to monitors, the availability of police to be deployed based on information provided by the camera system, the structure of a monitor’s work day, and the usability of the tools themselves all contribute to system effectiveness; a monitor can suffer from information overload from watching too many screens; the monitor may receive insufficient breaks to relieve the tedium<sup>241</sup>; the system itself might be difficult to use; or there may be too few police on the ground to respond to problems identified by the cameras, or to respond in a timely fashion. All of these factors can reduce the effectiveness of active surveillance.

Another important aspect to note is cost; we caution against speculating about the potential cost of an actively monitored surveillance system without a clear assessment of the probable goals of such a program. While it is beyond the scope of this report to provide projected costs for a monitored program, it is certain that a move toward an active system will absolutely raise the cost of what the City has spent to date, once all aspects are accounted for, such as additional equipment, engineering time (from either a system integrator or DTIS), employee costs, and the impact of increased calls for service on SFPD. In

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<sup>240</sup> London Assembly Liberal Democrats, “More CCTV on London’s Streets Doesn’t Help Solve Crime.” Published Sept. 19, 2007. Comments and data available at [http://www.glabdems.org.uk/news/000488/more\\_cctv\\_on\\_londons\\_streets\\_doesnt\\_help\\_solve\\_crime.html](http://www.glabdems.org.uk/news/000488/more_cctv_on_londons_streets_doesnt_help_solve_crime.html).

<sup>241</sup> It is important to note that even in high-crime areas, criminal incidents make up the minority of activity on an hour-to-hour basis. One of the persistent problems with active surveillance is operator boredom—the majority of time spent during a typical eight-hour shift will be observing normal, uneventful activity. Operator boredom can lead to quick burnout and high turnover if not addressed.

the event that City sources of funding are limited, San Francisco should consider seeking federal grants through the Department of Justice, or consider public-private partnerships.<sup>242</sup>

In several cases, City representatives and members of the press have suggested adding a monitoring component to the existing system of camera locations; we would highly recommend against this strategy and instead offer a proposal that we believe would have a greater likelihood of success. We believe adding monitoring to the existing network would be ineffective largely due to the wide dispersal of cameras throughout the City. This opinion is based both on a review of the research to date and the researchers' site visits to several U.S. cities, but specifically to Los Angeles, which has the best match we have observed with maintaining San Francisco's commitment to fighting crime in high-crime areas versus conducting generalized public surveillance.

Los Angeles has followed a highly discrete, targeted model (unlike Chicago, for example, which has installed cameras widely throughout the city); its video installations in MacArthur Park and the Jordan Downs Public Housing Complex focus on specific, high-crime areas.<sup>243</sup> With its MacArthur Park project, the LAPD's primary goal was to make the park safe for public enjoyment by focusing on changing the behavior by setting a new standard for public comportment. Video surveillance was a key part—but not the only part—of this strategy. Additionally, LAPD anticipated that by cracking down on a wide variety of crime in the park (initially severe crimes such as prostitution and drug sales; later, as serious crime decreased, more quality-of-life offenses), LAPD officers would need to control for displacement by increasing their presence in the surrounding areas. LAPD was also prepared to devote more policing resources to the area to accommodate the increased number of calls for service and reports for as long as it took to stabilize the area and reach the “tipping point” of establishing new norms for behavior by making it clear that the types of criminal behavior that had been previously tolerated in the area would no longer go unpunished. Finally, LAPD also coordinated its efforts with both community groups and Los Angeles agencies to ensure that some of the underlying social issues causing crime were addressed and that the community had a means for providing feedback on the effort to LAPD.

LAPD considers the MacArthur Park experiment a success; a USC evaluation of the Jordan Downs and Hollywood Boulevard camera projects was not able to establish a statistically significant

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<sup>242</sup> We would recommend reviewing Los Angeles's model for public-private financing for both its strengths and limitations; while the city was able to procure some donations from private entities for equipment and in-kind technical support to install their camera system, it failed to procure funding for system maintenance and upgrades. The lack of future financing caused some of LAPD's network to fall into disrepair until funding for upkeep could be secured.

<sup>243</sup> LAPD also has an installation along Hollywood Boulevard.

decrease in crime. In response, the LAPD points to both its own crime reports as well as qualitative evidence (such as the change of character of the area; families now use the park where few people did before, and new and old businesses have opened and reopened in and around the park) that the targeted effort has succeeded in transforming both the behavior and character of the area. LAPD's efforts in the Jordan Downs housing are more recent, and it is not clear yet whether successes there have been as dramatic. We refer readers to the USC/California Research Bureau report for an independent and detailed assessment of Los Angeles's efforts to date, though it is important to note that the report focuses on the LAPD's Jordan Downs and Hollywood Boulevard installations and not on MacArthur Park.<sup>244</sup>

Los Angeles's effort utilizes several strategic approaches:

- Limiting camera placement to a discrete area: Much work in criminology notes that the physical characteristics of places are important to consider when evaluating high-crime areas. Focusing video surveillance on a discrete high-crime area with a high density of cameras allows police to introduce public guardianship and enforcement of laws to an area that lacked both previously.
- Long-term commitment of substantial resources: Because the LA effort was focused on changing behavior in the area as a key to reducing crime, it was not enough to merely install video surveillance cameras and respond to crime identified through this new vector. LAPD officers had to commit to both dealing with the increase in crime reports once the project had begun (as previously unreported or unidentified crime gained notice), and then in turn adapt their policing approach over time once crime patterns began to change. Most importantly, the LAPD foresaw that the effort would require years of investment, and was committed to maintaining a consistent level of resources until it was clear the project had made an impact and crime levels had stabilized.
- Engaging community resources and social services: While surveillance may change offender behavior, it won't eliminate crime or address the issues that many believe are at the root of criminal behavior: lack of employment opportunities, lack of access to quality education, and so on. LAPD recognized that confronting some of the social factors that contribute to crime in the neighborhood would be necessary for the project to have a

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<sup>244</sup> Cameron, A., Kolodinski, E., May, H., and Williams, N. (2008). Measuring the Effects of Video Surveillance on Crime in Los Angeles. California Research Bureau CRB-08-007. Available at [www.library.ca.gov/crb/08/08-007.pdf](http://www.library.ca.gov/crb/08/08-007.pdf).

lasting impact; otherwise, despite increased police presence, displacement of criminal activity would be more likely than true deterrence.

Like Los Angeles, San Francisco has several discrete geographical areas where crime is rampant and where greater guardianship by the police and the community could help to reestablish lawfulness. Should the City wish to experiment with a monitored system, we propose that it identify candidate locations based on crime rates and types of crime, propensity of the geographic area to a targeted camera-based policing effort, SFPD resources, and community acceptance. We would further recommend the City initially target its efforts to no more than two locations, and not increase the scope of the program before a thorough evaluation is conducted to assess efforts. This would likely place the project on a timeline of three or more years. It should be stated again that even this proposal is not likely to eliminate crime from the targeted area. While crime reduction would be a primary goal, another would be to attempt to permanently change a now unsafe, crime-ridden area to make it safer and more livable for its residents.

No matter what approach the City decides to take, we highly recommend it conduct careful and critical research, reviewing both existing evaluations as well as conducting site visits to other municipalities, before adopting any technological changes to the CSC program. Furthermore, we recommend that with any changes the City implements, it do so with a clear evaluation strategy in place in order to ensure that effectiveness of the program can be measured optimally over time.

## **Conclusion**

In conclusion, if violent crime continues to be the primary motivation for the CSC system a radical rethinking must occur; if San Francisco believes the documented effects on property crime provide an independent and compelling basis for the program, it may want to reevaluate its camera placement strategy. But the system is clearly having an effect; should the City wish to continue the forensic approach of this program, a reevaluation of its goals are in order to better align them with the needs and limitations facing the end-users of the system (DEM, DTIS, SFPD investigators, prosecutors, defenders, victims, defendants, and juries).

At the same time, given the lack of deterrent effect on violent crime and its limited usefulness with respect to investigations, it is clear that one of the questions the City must consider is whether or not to continue the CSC program at all. To that end, the goal of this report was to give the City sufficient information, guidelines, and advice to engage in a cost-benefit analysis to determine ultimately whether or not the CSC program offers a sufficient return on its investment. To that end, it is our hope that this report proves useful.

# Appendix I: A Review of Relevant Criminological Theory Relating to Video Surveillance and Deterrence

## Relevant Research and Theory

The vast majority of evaluations of both surveillance cameras generally and public surveillance systems specifically have occurred in the United Kingdom (and more broadly in Europe), which has been actively deploying public surveillance technology since the early 1990s. These studies have taken many forms and focuses, including controlled studies examining crime rates before and after cameras were installed in city centers, shopping districts, parking lots, and public housing; interviews with suspects apprehended by CCTV; and numerous surveys, both general and of residents living in areas under surveillance, attempting to gauge attitudes toward CCTV and its effect on fear of crime.<sup>245</sup>

As of summer 2008, there are only two independent evaluations of surveillance camera programs in the United States: an evaluation of Philadelphia's CCTV camera system conducted by Temple University researchers published in February 2008 and an evaluation of two of Los Angeles's camera installations conducted by the California Research Bureau and the USC School of Policy, Planning, and Development published in May 2008. In 2007, the Urban Institute in Washington, DC received a grant to conduct an eighteen-month study of four U.S. cities with public surveillance systems: Chicago, Baltimore, Hyattsville, MD, and Wilkes-Barre, PA. Results from this study will not be available before 2010. In 2008, Washington, DC's Metropolitan Police Department released its 2007 annual report of its camera system,<sup>246</sup> but this report does not provide an independent evaluation of the system's effectiveness.

A review of the academic research conducted over the past fifteen years demonstrates a "consistent inconsistency": after nearly two decades, there is no definitive answer as to whether or not video surveillance of public places "works." There are enough conflicting results to note the difficulty in generalizing results; not all surveillance systems are created equally, and neither are most cities. Differences in equipment, deployment, management, and quality among systems, combined with

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<sup>245</sup> A comprehensive list is outside the scope of this report, but a few notable resources include: Gill and Spriggs' *Home Office Research Study 292*, Norris C., Moran, J. and Armstrong, G.: *Surveillance, Closed Circuit Television and Social Control* (1999), Welsh, B. & Farrington, D., *Effects Of Closed Circuit Television on Crime* (Annals of the American Academy of Political and Social Science 2003; 587; 110).

<sup>246</sup> Metropolitan Police Department. *Closed Circuit Television System 2007 Annual Report*. Available at <http://mpdc.dc.gov/mpdc/cwp/view,A,1246,Q,555551.asp> (visited August 26, 2008).

differences in demographics, built environment, lighting, crime rates, crime types, economics, culture, and geographical area among cities (and countries), just to cite a sampling of factors, all contribute to the difficulty in making direct comparisons and generalizations from one study to another. These issues highlight the need for more evaluation studies in the United States, accounting for the geographical, environmental, and cultural factors that could make the application of U.K. and other European findings incompatible.

Despite these issues, the details that arise when examining existing evaluation research point toward the need to refine the research question; it may not be whether or not public video surveillance “works,” but more specifically “under what specific contexts might it work?” The public generally assumes that the mere existence of cameras may deter crime, but the mixed findings of existing research clearly demonstrate that is not the case; many studies have even documented an *increase* in crime after the installation of CCTV. In London, arguably the most surveilled city in the world to date, the Liberal Democrats argued in 2007 that the city’s thousands of cameras did not improve rates for solving crimes, let alone preventing crimes, suggesting “there is no link between a high number of CCTV cameras and a better crime clear-up rate.”<sup>247</sup>

There are also many controlled studies that do demonstrate statistically significant decreases, which returns us to the previous question: what contexts, or what factors, might have contributed to success in each of these cases? If, for example, the mere existence of cameras does not decrease crime, what other factors may have played a role in contributing to a decrease once a camera system was installed? This question indicates the need for evaluation studies that look more broadly than only at changes in crime rates, one of the primary goals of this study.

### **Theoretical Basis for Video Surveillance**

The aforementioned evaluation research provides general support for questioning the continued expansion of surveillance camera deployment in the United States; however, Americans seem to largely support the expanded use of surveillance cameras regardless. According to a public opinion poll conducted by the Washington Post and ABC News in July 2007, 71 percent of Americans support the increased use of

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<sup>247</sup> Davenport, Justin. “Tens of Thousands of CCTV Cameras, Yet 80% of Crime Unsolved.” *Evening Standard*, September 19, 2007. Retrieved August 26, 2008 from <http://www.thisislondon.co.uk/news/article-23412867-details/Tens+of+thousands+of+CCTV+cameras%2C+yet+80%25+of+crime+unsolved/article.do>.

surveillance cameras in public places.<sup>248</sup> The persistent support for video surveillance is not only expressed in public opinion polls, but also in the polling booths. For example, Philadelphian voters—by an approximate four to one ratio—overwhelmingly approved a May 2006 referendum to amend their Home Charter to encourage the use of video surveillance systems.<sup>249</sup> A recent evaluation of Philadelphia’s subsequent video surveillance program associated the cameras with a 13 percent reduction in crime, which provided further evidence for the continued expansion of Philadelphia’s program.<sup>250</sup> Absent rigorous evaluation studies of a particular video surveillance program, however, policymakers and the larger public often rely on a “faith-based” belief in the ability of video surveillance to deter crime. Thus, the limited evaluation studies available often focus on the impact video surveillance programs make on crime rates as a way to test the predominant assumption of a general deterrent value.

Although there is contradictory evidence indicating whether or not public video surveillance is effective, there is general agreement among criminologists as to how it may work to reduce crime. As outlined in previous studies, video surveillance can lead to criminal deterrence through several different and related causal mechanisms. In *Realistic Evaluation*, Pawson and Tilley created a list of the causal mechanisms whereby video surveillance can deter crime, which the following table summarizes:

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<sup>248</sup> The Washington Post (2007). Washington Post-ABC News Poll. Retrieved August 3, 2008 from [http://media.washingtonpost.com/wp-srv/politics/ssi/polls/postpoll\\_072307.html](http://media.washingtonpost.com/wp-srv/politics/ssi/polls/postpoll_072307.html).

<sup>249</sup> Shields, Jeff. (July 24, 2008). Problems with Philadelphia Surveillance Cameras to Delay Project. *The Philadelphia Inquirer*, B05. [Online], City, D ed., Lexis-Nexis: Academic [August 3, 2008].

<sup>250</sup> Ratcliffe, J. and Taniguchi, T. (2008). CCTV Camera Evaluation. *Temple University*. Retrieved August 3, 2008 from [www.temple.edu/cj/misc/PhilaCCTV.pdf](http://www.temple.edu/cj/misc/PhilaCCTV.pdf).



| <b>Table 1: Causal Mechanisms of Video Surveillance’s Crime Reduction</b> <sup>251</sup> |   |
|--|---|
| <b>Causal Mechanism</b>  | <b>Description</b>  |
| <b>Pawson and Tilley’s Causal Mechanisms</b>   |   |
| Caught in the act  | Video surveillance could reduce crime by increasing the chance that offenders will be caught, incapacitated, and deterred.  |
| You’ve been framed   | Video surveillance could reduce crime by providing the potential for incriminating evidence captured on video.  |
| Nosy parker  | Video surveillance may increase traffic within the area under surveillance because visitors may feel safer. The resultant increase in usage could thereby enhance natural surveillance, which may deter potential offenders who could feel at an increased risk of apprehension.  |
| Effective deployment   | Video surveillance may increase the response of police officers toward areas where suspicious behavior is occurring. These officers could arrest offenders or deter potential offenders with their presence. <sup>252</sup>   |
| Publicity  | Video surveillance cameras and/or signs indicating their operation may symbolize efforts to take crime seriously and reduce it. The offender may then perceive an increased risk in these areas, and/or the perceived effort may lead to collective efficacy whereby the community more fully participates in the effort against crime. |
| Time for crime   | Video surveillance may encourage criminals to avoid crimes that take more time to commit because of a fear of law enforcement units responding to the video footage. <sup>253</sup> Times that take less time will be perceived as presenting a lesser risk.  |
| Memory jogging   | Video surveillance cameras and/or signs indicating their operation may remind area visitors that they are vulnerable, thus encouraging them to take additional security precautions that can deter crime on their own.  |
| Appeal to the cautious   | Video surveillance may attract visitors who are more cautious, which may drive out visitors who are less cautious as the area becomes more crowded. Cautious people will be more willing to pay the premium of crowded conditions to feel safe and their related cautious behavior may also serve to prevent crime. <sup>254</sup>      |
| <b>Armitage, Smyth, and Pease’s Additions to the Causal Mechanisms</b> <sup>255</sup>    |   |

<sup>251</sup>Cameron, A., Kolodinski, E., May, H., and Williams, N. (2008). Measuring the Effects of Video Surveillance on Crime in Los Angeles. *California Research Bureau*. CRB –08-007 p. 12. Retrieved on August 3, 2008 from [www.library.ca.gov/crb/08/08-007.pdf](http://www.library.ca.gov/crb/08/08-007.pdf).

<sup>252</sup> San Francisco does not actively monitor their cameras, which may make this causal mechanism less applicable.

<sup>253</sup> San Francisco does not actively monitor their cameras, which may make this causal mechanism less applicable.

<sup>254</sup> Pawson, R. and Tilley, N. (1997). *Realistic Evaluation* (pp. 78–79). London: Sage Publications.

<sup>255</sup> Armitage, Smyth, and Pease cited Pawson and Tilley’s work, but added two additional casual mechanisms to their list.

|                     |  |
|---------------------|--|
| Anticipated shaming | Video surveillance cameras may encourage visitors to take additional security precautions for fear of others viewing their indiscretions on video. |
| Reporting changes   | People may report and/or record manipulated levels of crime to help demonstrate the desired impact of video surveillance. <sup>256</sup>           |

In addition to these causal mechanisms, Pawson and Tilley claim that the context of the video surveillance can greatly determine its deterrent value. As stated by Pawson and Tilley, “Without a theory of why CCTV may be effective, and a theory of the conditions which promote this potential, research into its usage is blind.”<sup>257</sup> Accordingly, the two authors propose that the aforementioned causal mechanisms interact with the following contexts:

| <b>Table 2: Pawson and Tilley’s Contexts for Video Surveillance</b> |   |
|---|---|
| <b>Context</b>  | <b>Description</b>  |
| Criminal clustering   | Crime rates may result from widely differing prevalence rates of offending. If relatively few criminals are responsible for a large portion of crime, catching criminals in the act via the “caught in the act” mechanism seems particularly valuable to a surveillance program.  |
| Style of usage  | A highly frequented area under surveillance may post higher amounts of crime, but lower crime rates per visitor. If an area is fully utilized prior to video surveillance, such as a crowded parking facility, video surveillance may not be able to encourage additional visitation of the areas under surveillance through the “appeal to the cautious” and “nosy parker” mechanisms above—thus, there may be no impact on crime rates via these mechanisms under this context. |
| Lie of the land   | Areas that the video surveillance camera cannot view, such as behind a telephone pole, would realize little reduction in crime if the casual mechanism was “you’ve been framed,” but would realize reductions equal to the other areas in range of the surveillance if it were “memory jogging.”  |
| Alternative targets   | Local and individual motivating factors, as well as the availability of alternative targets, help determine the amount of displacement that occurs from a specific surveillance area.   |
| Resources   | Without active monitoring, or if police or other security personnel are otherwise   |

<sup>256</sup> Armitage, R., Smuth, G., Pease, K. (1999). Burnley CCTV Evaluation. In K. Painter and N. Tilley (Eds.). *Surveillance of Public Space: CCTV, Street Lighting and Crime Prevention*, p. 227. Monsey, NY: Criminal Justice Press.

<sup>257</sup> Pawson, R. and Tilley, N. (1997). *Realistic Evaluation*, p. 82. London: Sage Publications.

|                      |  |
|----------------------|--|
|                      | unavailable to respond, crime deterrence through the “effective deployment” mechanism will not occur.  |
| Surveillance culture | As video surveillance becomes more widely deployed, its reputation will more greatly determine the impact that the “publicity” mechanism has on would-be offenders. <sup>258</sup> |

The contexts listed above, while not collectively exhaustive, demonstrate the significance of place in the ability for casual mechanisms to effectuate a reduction in crime. The causal mechanisms’ reliance on context demonstrates the need for video surveillance programs to specifically define the crimes targeted for reduction, and to structure the cameras’ placement, quantity, and technology accordingly.

Classical criminology and rational choice theory represent the theoretical basis for deterrence in the context of locations under video surveillance. Under this paradigm, people choose to commit crime after weighing the costs and benefits of their criminal activity. Thus, in order to deter crime, one must increase the perceived costs of criminal behavior. According to the principles of classical criminology, one can augment the perceived costs of crime and achieve deterrence by implementing programs and policies that enhance the apparent celerity, severity, and certainty of punishment for criminal activity.<sup>259</sup> Correspondingly, criminal justice policies and programs often aim to increase the perceived swiftness of punishment through plea bargaining, the perceived harshness through mandatory minimum sentences, and the perceived conviction rates through improved investigation methods and advertising of successfully prosecuted cases, as well as many other methods. Modern deterrence theory adopts classical criminology’s principles of celerity, severity, and certainty and “continues to attract many adherents today because of its direct applicability to policy on law enforcement.”<sup>260</sup> Criminal law and law enforcement seek to provide two forms of deterrence in society: 1) general deterrence and 2) specific deterrence. The prevention of the general public from committing crime represents the goal of general deterrence, whereas the prevention of recidivism represents the goal of specific deterrence.<sup>261</sup> The increasing implementation of video surveillance programs across the United States seems to rely most heavily on the principles of deterrence doctrine. Video surveillance supports general deterrence by increasing the perceived risk of punishment for criminal activity, whereas the actual punishment resulting from video surveillance evidence supports specific deterrence. Despite the dearth of critical evaluation studies, organizations ubiquitously believe in

<sup>258</sup> Pawson, R. and Tilley, N. (1997). *Realistic Evaluation*, pp. 79–80. London: Sage Publications.

<sup>259</sup> Akers, Ronald (1999). *Criminological Theories: Introduction and Evaluation*, p. 17. Washington, DC: Taylor and Francis.

<sup>260</sup> Id.

<sup>261</sup> Siegel, L. and Senna, J. (2005). *Introduction to Criminal Justice*, p. 83 Boston: Thomson Wadsworth.

the deterrent value of video surveillance; in fact, the 2007 Electronic Monitoring and Surveillance Survey conducted by the American Management Association and the ePolicy Institute found that nearly half of respondent companies use video surveillance to counter theft, violence, and sabotage.<sup>262</sup> The increasing prevalence of video surveillance by companies and governments alike provides support for noted criminologist Ronald Akers' claim that "deterrence doctrine remains the philosophical foundation for modern Western criminal law and criminal justice systems."<sup>263</sup>

While few empirical studies of video surveillance programs in the United States exist, evaluation research in other related areas can also help guide public opinion and policymaking on the topic. For example, the 1988–1989 Minneapolis Hot Spots Patrol Experiment provides one example of the success of targeted deterrence-oriented programs that attempt to increase the perceived certainty of punishment by augmenting the perceived presence of law enforcement. The Minneapolis experiment included a population of the 110 highest crime rate hot spots in Minneapolis, with 55 randomly assigned to the treatment group and 55 to the control group.<sup>264</sup> The treatment group received about two to three times more police patrols than the control group and subsequently realized a 13 percent reduction in calls for service about crime when compared to the control group.<sup>265</sup> Similar to several of the aforementioned evaluations of video surveillance, the Minneapolis experiment found that the reduction in hard crimes (e.g., rape, robbery, stabbings, and shootings) did not produce statistically significant results; however, the reduction in observed disorder (e.g., drug dealing, soliciting for prostitution, and urinating in public) presented a 50 percent relative reduction.<sup>266</sup> Much of the observed reduction in crime resulted from residual effects of the extra police patrol after the police left the targeted areas.<sup>267</sup> Anthony Braga's 2006 meta-analysis of several hot-spot crime prevention experiments found that "seven of nine selected evaluations reported noteworthy crime and disorder reductions."<sup>268</sup> In theory, a camera intervention's

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<sup>262</sup> American Management Association (2008). 2007 Electronic Monitoring & Surveillance Survey. Retrieved August 3, 2008 from <http://press.amanet.org/press-releases/177/2007-electronic-monitoring-surveillance-survey/>.

<sup>263</sup> Akers, Ronald (1999). *Criminological Theories: Introduction and Evaluation*, p. 17. Washington, DC: Taylor and Francis.

<sup>264</sup> Sherman, L. (2004). Fair and Effective Policing. In J. Wilson and J. Petersilia (Eds.). *Crime: Public Policies for Crime Control*, p. 38). Oakland, CA: ICS Press.

<sup>265</sup> Sherman, L. and Weisburd, D. (1995). Does Patrol Prevent Crime? The Minneapolis Hot Spots Experiment. In K. Miyazawa and S. Miyazawa (Eds.). *Crime Prevention in the Urban Community*, p. 90. The Hague: Martinus Nijhoff Publishers.

<sup>266</sup> Sherman, L. and Weisburd, D. (1995). Does Patrol Prevent Crime? The Minneapolis Hot Spots Experiment. In K. Miyazawa and S. Miyazawa (Eds.). *Crime Prevention in the Urban Community*, pp. 92–93). The Hague: Martinus Nijhoff Publishers.

<sup>267</sup> Id.

<sup>268</sup> Braga, A. (2006). The Crime Prevention Value of Hot Spots Policing. *Psicothema* 18, p. 630. Retrieved on August 3, 2008 from <http://www.psicothema.es/pdf/3263.pdf>.

noticeable presence in a high-crime area could provide at least the same deterrent effect as that realized with increased police patrols in hot spots because the two strategies rely on similar causal mechanisms and theory. Furthermore, Braga's research also proves enlightening in that "when immediate spatial displacement was measured, it was very limited and unintended crime prevention benefits were associated with the hot spots policing programs."<sup>269</sup> Cross-applying the results of evaluation studies of increasing police patrols in targeted areas with increasing video surveillance in targeted areas, one could expect cameras to produce treatment persistency/residual effects, minimal displacement, and overall crime reductions, especially regarding crimes of disorder. Indeed, the view of video surveillance cameras as a "force multiplier" certainly equates the presence of the cameras with the presence of the actual police force.<sup>270</sup> Of course, making the connection between increased police patrols and increased video surveillance requires the adoption of several theoretical assumptions at the foundation of each program.

As stated by USC researchers in an evaluation of Los Angeles video surveillance systems, "supporters of video surveillance typically adhere to 'rational choice' theories or environmental criminology, both of which emphasize place-based constraints on criminal behavior."<sup>271</sup> Hot-spots patrol and video surveillance programs both rely on these place-based constraints on criminal behavior.<sup>272</sup> In fact, the concepts of environmental criminology and rational choice theory, combined with routine activity theory and crime pattern theory, collectively underlie situational crime prevention theory and crime science as espoused by Ronald Clarke.<sup>273</sup> According to Clarke, situational crime prevention theory embodies the following three defining characteristics:

- 1) Explanation for crime is focused more directly on the criminal event;
- 2) The need to develop explanations for separate categories of crimes is made explicit; and
- 3) The individual's current circumstances and the immediate features of the setting are given considerably more significance than past histories and systemic influences.<sup>274</sup>

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<sup>269</sup> Id.

<sup>270</sup> Cameron, A., Kolodinski, E., May, H., and Williams, N. (2008). Measuring the Effects of Video Surveillance on Crime in Los Angeles. *California Research Bureau*. CRB -08-007 p. 12. Retrieved on August 3, 2008 from [www.library.ca.gov/crb/08/08-007.pdf](http://www.library.ca.gov/crb/08/08-007.pdf).

<sup>271</sup> Id.

<sup>272</sup> Id.

<sup>273</sup> Clarke, R. (1980). "Situational" Crime Prevention: Theory and Practice. *British Journal of Criminology* 20: 2, 136-137. and Newburn, Tim (2007). *Criminology*, p. 294. Portland, OR: Willan Publishing.

<sup>274</sup> Clarke, R. (1980). "Situational" Crime Prevention: Theory and Practice. *British Journal of Criminology* 20: 2, 139.

Under a situational crime prevention approach, places become central to crime prevention and criminogenesis. Eck and Weisberd, in *Crime and Place: Crime Prevention Studies*, point out that “three recent theoretical perspectives—rational choice, routine activity theory and crime pattern theory—have influenced our understanding of the importance of place in crime prevention efforts.”<sup>275</sup> As outlined previously, rational choice theory suggests, “Offenders will select targets . . . in a manner that can be explained.”<sup>276</sup> Rational choice theory relies on individuals to make rational decisions, which admittedly does not cover all criminal decision making, but should account for less impulsive crimes.

Routine activity theory, which receives support from rational choice theory, “seeks to explain the occurrence of crime events as the confluence of several circumstances.”<sup>277</sup> According to routine activity theory, most crime occurs in the presence of four circumstances:

- 1) A motivated offender;
- 2) A desirable target;
- 3) The meeting of the offender and the target; and
- 4) The absence or ineffectiveness of “controllers,” including “intimate handlers,” “guardians,” and “place managers.”<sup>278</sup>

Video surveillance focuses on directly altering the fourth circumstance above, but through its related causal mechanisms, such as the “caught in the act” and “nosy parker” causal mechanisms discussed above, it may also indirectly impact the other three. “Guardians,” which traditionally include security guards or police, represent a layer of protection at the site. Rational choice and routine activity theories support the assertion that video surveillance will deter potential criminals by introducing effective “controllers,” or “guardians,” at each of the areas under surveillance.<sup>279</sup> According to crime pattern theory, which combines the rational choice and routine activity theory perspectives, “reasonably rationale offenders, while engaging in their routine activities, will note places without guardians.”<sup>280</sup> Thus, one could theorize that the introduction of “guardians” (e.g., the video surveillance) in “areas offenders routinely move through” (e.g., the targeted areas for surveillance) will increase risk and deter would-be criminals in those areas.

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<sup>275</sup> Eck, J. and Weisberd D. (1995). Crime Places in Crime Theory. In J. Eck and D. Weisberd (Eds.). *Crime and Place: Crime Prevention Studies*, p. 5. Monsey, NY: Criminal Justice Press.

<sup>276</sup> Id.

<sup>277</sup> Id.

<sup>278</sup> Id.

<sup>279</sup> Id.

<sup>280</sup> Id.

Jerry Ratcliffe, the author of “Video Surveillance of Public Places,” correctly points out that in order for the video surveillance’s general deterrent effect to occur, two elements must exist:

- 1) The offender must be aware of the camera’s presence; and
- 2) The offender must believe the camera’s presence enough risk of capture to negate the rewards of the intended crime.<sup>281</sup>

In order for specific deterrence to occur, the video surveillance must adequately support the punishment of offenders by providing for the increased efficacy of detection, apprehension, prosecution, and/or incapacitation. One would anticipate a greater specific deterrence impact with active monitoring systems, versus passive ones, because active monitoring can provide the vehicle for the initial detection of a crime that can support later punishment. Regardless, even passively monitored video surveillance systems can provide the “controllers” or “guardians” to generally deter potential offenders. To bring the analysis back to the basic elements of deterrence doctrine (certainty, celerity, and severity), video surveillance theoretically supports general deterrence by increasing the perceived certainty of capture and successful prosecution, as well as the perceived swiftness of punishment in the midst of video evidence. Coupled with the oft-severe punishments already promulgated in the criminal justice system, the aforementioned theories support the idea that video surveillance could generally, and specifically, deter crime. Furthermore, since crime pattern theory suggests that offenders become aware of their targets in the course of their routine activities, hardening of the target areas with video surveillance “guardians” should not result in the displacement of crime because, as Eck and Weisberd note, “few offenders . . . aggressively seek out unchartered areas.”<sup>282</sup> Thus, similar to targeted police patrols in hot spots, relevant theory suggests that video surveillance should deter criminals and reduce crime with minimal displacement—so long as potential offenders recognize when they are under surveillance and respond rationally to that recognition.

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<sup>281</sup> Ratcliffe, J. (2006). Video Surveillance of Public Places. *Problem-Oriented Guides for Police Response Guide Series*, No. 4. U.S. Department of Justice.

<sup>282</sup> Eck, J. and Weisberd D. (1995). Crime Places in Crime Theory. In J. Eck and D. Weisberd (Eds.). *Crime and Place: Crime Prevention Studies*, p. 6. Monsey, NY: Criminal Justice Press.

As Ratcliffe claims, “[i]n theory, CCTV should provide the guardianship necessary to prevent crime, but this concept requires that offenders demonstrate rationality in their behavior.”<sup>283</sup> If the offender does not notice or believe in the camera’s presence and risk, the offender may assume the absence or ineffectiveness of “controllers” at the area under surveillance. One study found that only one-third of respondents knew when they were under video surveillance on a public street.<sup>284</sup> Even with signage and publicity, one cannot assume that potential offenders become cognizant of areas under surveillance and respond rationally under such situations. Offenders under the influence of alcohol or other drugs, as well as those motivated by overwhelming emotion, may override rational tendencies and commit crimes despite knowing they are under surveillance, or even not notice the video surveillance altogether.<sup>285</sup> Perhaps this tendency helps explain the disparity in video surveillance’s deterrent impact on opportunistic property crimes and its impact—or lack thereof—on more impulsive crimes of violence.<sup>286</sup> As the existing evaluation studies demonstrate, the effectiveness of video surveillance relies on the convergence of the correct causal mechanism with the appropriate context to address specific types of crime; without this convergence and specificity, video surveillance will not succeed at its intended goals.

The preceding analysis notably excludes the more robust literature of criminological theory that concerns itself with the individual or societal causes of crime—what Ronald Clarke refers to as “dispositional” theories of crime.<sup>287</sup> These “dispositional” theories do not focus on “situational determinants” of crime that remain a central element of environmental criminology and situational crime prevention interventions, including video surveillance.<sup>288</sup> Rather, positivist criminology and other forms of “dispositional” theories focus on the biological, psychological, or sociological roots of criminal behavior.<sup>289</sup> In so doing, “dispositional” theories can theoretically seek to eliminate crime and prevent displacement of criminal activity. Without addressing the root causes of crime and the criminogenesis in individuals and society, situational crime prevention strategies appear susceptible to displacing crime by focusing on the “immediate choices and decisions made by the offender.”<sup>290</sup> According to “dispositional theories,” a criminal deterred from crime in one area, may simply commit the crime somewhere else if

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<sup>283</sup> Ratcliffe, J. (2006). Video Surveillance of Public Places. *Problem-Oriented Guides for Police Response Guide Series*, No. 4. U.S. Department of Justice.

<sup>284</sup> Id.

<sup>285</sup> Id.

<sup>286</sup> Id.

<sup>287</sup> Clarke, R. (1980). “Situational” Crime Prevention: Theory and Practice. *British Journal of Criminology* 20: 2, 136.

<sup>288</sup> Id.

<sup>289</sup> Id.

<sup>290</sup> Clarke, R. (1980). “Situational” Crime Prevention: Theory and Practice. *British Journal of Criminology* 20: 2, 13.



an intervention fails to address their underlying motivations. Short of hardening all targets with the appropriate video surveillance, some criminological theorists reject the sustainability of situational crime prevention strategies. While crime pattern theory suggests that the hardening of targets that fall within the routine path of potential offenders should prevent crime without displacing it, a dynamic population of would-be offenders could provide an ever-changing variety of routine activities and corresponding targets. Despite the inherent challenges associated with situational crime theory, Clarke and others suggest that “dispositional” theories present even greater obstacles. Clarke claims that dispositional theories of crime “propose methods of preventative intervention precisely where it is most difficult to achieve any effects, i.e. in relation to the psychological events or the social economic conditions that are supposed to generate criminal dispositions.”<sup>291</sup> Video surveillance systems do not resolve psychological, emotional, economic, or social conditions that can lead to crime, but the systems do present the opportunity to prevent specific types of crime under specific contexts through the variety of causal mechanisms mentioned above. In order to support the success of a video surveillance program, an implementing organization should carefully design its surveillance camera system to address appropriate and realistic crime reduction goals. While the video surveillance system does not represent a panacea, and some would argue that it more closely resembles a pharmacon (i.e., part medicine and part poison), apposite goals and operating guidelines can help ensure that the system does more good than harm.

Since the aforementioned review of relevant criminological theory suggests that cameras should reduce opportunistic crimes and result in little effect on impulsive crimes, such as violent crimes of passion, the CSC program’s primary goal of reducing violent crimes appears particularly challenging. Still, if the “broken windows” theory holds true—and many claim it doesn’t<sup>292</sup>—even a reduction in opportunistic crimes and other quality-of-life-related crimes of disorder should ultimately result in a reduction of violent crime over time. With the primary program goal to reduce violent crime shared among the multiple sources consulted with for this study, any program evaluation must take all possible steps to assess the surveillance camera’s success at reducing violent crime. Subject to the limitations of conducting a natural experiment, the following section describes the methods taken to ensure an appropriate evaluation of San Francisco’s CSC program—both in regard to violent crimes, and crimes in general.

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<sup>291</sup> Id.

<sup>292</sup> Harcourt, B. (2001). *Illusion of Order: The False Promise of Broken Windows Policing*. Cambridge, MA: Harvard University Press.

## Appendix 2: Technical Overview of the CSC System

### Current Camera Program

The total funds spent on the technical aspects of the CSC program since inception was \$700,000 for seventy-one cameras as of April 2008<sup>293 294 295</sup>. This figure is inclusive of the cost of equipment, storage, and personnel/labor costs for maintenance of the camera network. The cameras are used in both daytime and nighttime. Nighttime camera-use capabilities exist due to certain cameras' capability of operating at low light levels (via black-and-white, low-light operation of certain cameras).

### CSC Equipment

The seventy-one cameras currently deployed by the City consist of three types of cameras with resolutions<sup>296</sup> ranging between 2 and 5 mega-pixels (MP). The cameras are all networked and connected to a base station server in a wired or wireless fashion.

The three types of cameras are as follows:

- 1) Fixed-position network cameras—The cameras have fixed views and cannot be manipulated through software. The cameras are each enclosed in a large box housing and the direction the cameras are pointing is readily determined by plain eyesight.<sup>297 298 299</sup>

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<sup>293</sup> Bulwa, Demian “Newsom wants to add 25 cameras,” *San Francisco Chronicle*, October 5, 2007. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/10/05/MNR7SK0VL.DTL&hw=Newsom+wants+to+add+25+cameras&sn=001&sc=1000>. Interview with DTIS staff.

<sup>294</sup> Bulwa, D. and Stannard, M. “Focus on Security Cameras: Is it worth the cost?” *San Francisco Chronicle*, August 17, 2007. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2007/08/17/MNU0RJUQ7.DTL&hw=Security+Camera+Is+it+worth+the+cost&sn=001&sc=1000>.

<sup>295</sup> Interview with DTIS staff.

<sup>296</sup> Resolution pertains to the total number of separate pixels that can be captured by the camera.

<sup>297</sup> Interview with DTIS staff.

<sup>298</sup> IQEYE 600 Series Camera Specifications: <http://www.iqeye.cz/podpora/iqtechspec.pdf>.

<sup>299</sup> IQEYE 700 Series Camera Specifications: [http://www.iqeye.com/iqeye/images/uploads/File/Sales\\_Datasheets/700750\\_Datasheet.pdf](http://www.iqeye.com/iqeye/images/uploads/File/Sales_Datasheets/700750_Datasheet.pdf).



**Figure 1: IQeye 700 series fixed-position network camera without housing**

2) Pan-Tilt-Zoom (PTZ) cameras—The field of view of these cameras can be automatically and remotely repositioned (pan and tilt) and zoomed. The cameras are enclosed in large box enclosures and lens direction is also readily determined by plain eyesight. Two of these cameras, which operate at very low resolutions, are currently part of the CSC system. The CSC system is not monitored therefore the PTZ functionality is not used<sup>300 301 302</sup>.



**Figure 2: Sony SNC-RZ30N PTZ camera without enclosure**

3) Non-mechanical, fixed-position, mini-dome network cameras—These consist of a camera (with CS-mount fish-eye lens) mounted inside a dome-shaped housing. The cameras are less conspicuous than the other cameras in the CSC system. The cameras can be mounted in any direction and have 360° field of view using a fish-eye lens. An advantage of these cameras is their capability to monitor and record a wide area. A disadvantage, however, is their low resolution (2 MP) when compared to fixed-position cameras (usually 3MP to 5MP). The current mini-dome network cameras used in the CSC system are operated in both low-light nighttime conditions as well as daytime conditions<sup>303 304</sup>.

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<sup>300</sup> Knight, Heather. “Crime cameras not capturing many crimes,” *San Francisco Chronicle*, March 21, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2008/03/21/MN27VNFET.DTL>.

<sup>301</sup> Interview with DTIS staff.

<sup>302</sup> Sony SNC-RZ30N Camera Specifications: <http://www.allaboutvideo.com/PDF/Sony%20SNC-RZ30N%20specs.pdf>.

<sup>303</sup> Interview with DTIS staff.

<sup>304</sup> IPIX 360° Camera Specifications: [http://www.ipix.com/downloads/ae\\_specs/CV-D2000-DN.pdf](http://www.ipix.com/downloads/ae_specs/CV-D2000-DN.pdf).



**Figure 3: IPIX 360° fixed-position, mini-dome network camera**

| Camera Models                              |                      |                     |                             |                             |   |
|--|----------------------|---------------------|-----------------------------|-----------------------------|---|
|  | IPIX 360° CV-D2000DN | IQeye 603           | IQeye 753                   | IQeye 755                   | Sony SNC-RZ30N (model mislabeled in City documentation) |
| <b>Camera Type</b>                         | Mini-dome            | Fixed-Position      | Fixed-Position              | Fixed-Position              | PTZ Camera  |
| <b>Max Resolution</b>                      | 2 MP                 | 3.1 MP              | 3.1 MP                      | 5 MP                        | 0.3 MP  |
| <b>Max Data Rate at Highest Resolution</b> | 11 fps               | 12 fps              | 12 fps                      | 10 fps                      | 30 fps (possibly not at max data rate)                  |
| <b>Nighttime Operation Possible</b>        | Yes                  | Yes                 | Yes                         | Yes                         | Yes   |
| <b>Lens Type</b>                           | CS-mount, Varifocal  | CS-mount, Varifocal | 0.5 in. CS-mount, Varifocal | 0.5 in. CS-mount, Varifocal | CS-mount, Varifocal                                     |

**Table 1: Comparison of Camera Types Used in Current Program**

All three types of cameras in the CSC system are configured to compress and forward the video data as it is collected. The data is compressed using lossy JPEG compression techniques (incorporating the Discrete Cosine Transform DCT in the JPEG algorithm). The use of lossy compression implies that all the image data is collected and analyzed by the compression algorithm, but only the parts of the image that contain the most information are kept and the rest of the image data is lost. Using this lossy compression technique, 20 percent of the data that is collected is lost. As a result, the images that are transmitted and stored by the CSC system are less clear and sharp than they were when they were captured (from a loss in resolution from compression).<sup>305 306 307</sup>

<sup>305</sup> Interview with DTIS staff.

<sup>306</sup> Bulwa, Demian. “New criminal justice chief wants cops monitoring cameras,” *San Francisco Chronicle*, February 7, 2008. Available at <http://www.sfgate.com/cgi->



**Figure 4: Typical camera housings and mounting used by San Francisco**

Generally, as camera resolution increases, the frame rate (measured as frames per second, or FPS) decreases. This is because as camera resolution increases the amount of data being reported per unit time increases as well. Therefore, after accounting for processing time, compression time, etc., the frame reporting period between successive frames increases, thereby decreasing the FPS. As confirmed by the camera specifications (see Table 1), the maximum achievable frame rates at maximum resolution for the cameras are 11–12 FPS for the IPIX camera and the 3.1MP cameras. For 5MP cameras, the maximum frame rate is 10 FPS.<sup>308 309 310 311</sup> Since real-time video that is seamless to the human eye has to be 24–30 FPS, the 10–12 FPS footage captured by the cameras will seem to have more gaps in time and motion by comparison.

If DTIS is operating all the cameras at maximum resolution and if the City is moving toward 5MP cameras, the very best frame rate that can be achieved is 10 FPS by current vendor technology. DTIS reports that all of the cameras currently in operation transmit maximum-resolution image data. The frame rates of all of the non-L.P. cameras are between 3 and 4 FPS. Although these cameras are capable of delivering 10–12 FPS, as we discussed, the rate has been purposely decreased to 3–4 FPS by DTIS staff to accommodate the limitations in system storage (see Table 1).<sup>312 313 314</sup> Again, 3–4 FPS

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[bin/article.cgi?f=/c/a/2008/02/07/BAPEUTF5K.DTL&hw=New+criminal+justice+chief+wants+cops+monitoring+cameras&sn=001&sc=1000](http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/02/07/BAPEUTF5K.DTL&hw=New+criminal+justice+chief+wants+cops+monitoring+cameras&sn=001&sc=1000).

<sup>307</sup> It is important to note that although in the process of writing this report we viewed a few still images from the Community Safety Cameras, we were unable to acquire or view any continuous video footage from the cameras due to strict regulations against the release of such footage. To the best of our knowledge, the only such footage that is publicly available can be found on the *San Francisco Chronicle* online website: <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/01/28/MN37TKH6O.DTL>.

<sup>308</sup> IPIX 360° Camera Specifications: [http://www.ipix.com/downloads/ae\\_specs/CV-D2000-DN.pdf](http://www.ipix.com/downloads/ae_specs/CV-D2000-DN.pdf).

<sup>309</sup> IQEYE 600 Series Camera Specifications: <http://www.iqeye.cz/podpora/iqtechspec.pdf>.

<sup>310</sup> IQEYE 700 Series Camera Specifications: [http://www.iqeye.com/iqeye/images/uploads/File/Sales\\_Datasheets/700750\\_Datasheet.pdf](http://www.iqeye.com/iqeye/images/uploads/File/Sales_Datasheets/700750_Datasheet.pdf).

<sup>311</sup> Sony SNC-RZ30N Camera Specifications: <http://www.allaboutvideo.com/PDF/Sony%20SNC-RZ30N%20specs.pdf>.

<sup>312</sup> In comparison, license plate capturing cameras in use by the City have average frame rates of 8 FPS.

footage captured by the non-L.P. cameras falls far short of the 24–30 FPS rate necessary for real-time footage, which is seamless to the human eye. This will result in the CSC system storing footage that seems to have more gaps in time and motion as compared to seamless, real-time footage.

An increase in the frame rate of reported data would result in an increase in total data that is aggregated at the server. With sufficient storage for this aggregated data, all of the video that is received by the cameras can be stored properly at the resolution at which it was captured. Currently, however, the system is severely limited in terms of storage capacity and it cannot adequately accommodate an increase in data (resulting from the change of storing footage at 10–12 FPS rather than at 3–4 FPS). Increasing storage capacity would give the CSC system the ability to store footage that has fewer gaps and that is clearer<sup>315</sup> than what the current storage capacity makes possible. An approximate upper-bound (measured in Petabytes (PB) of storage capacity necessary) for the amount of storage that is necessary to store this additional data can be found at the end of this Appendix. The system’s storage is further limited due to the need to archive the video footage for seven days (although an increase to a maximum of thirty days of archived video has been mandated by the City Board of Supervisors). Therefore, DTIS currently reduces the frame rate from the maximum allowable by the cameras (10–12 FPS) to a rate that can be accommodated by the current storage capacity (3–4 FPS). Note that the current system, as designed, does not preclude differential rates of storage (i.e., recently acquired video data can be stored at a higher rate than data acquired in the past). Although the City is not currently utilizing this capability, if implemented, this would allow for the effective storage capacity of the CSC system to be increased.

## Network Architecture

The “last-mile” link to each camera is either wired or wireless. The wired last-mile camera links employ the Ethernet 802.3 standard and use regular CAT5 Ethernet cable. These links have minimal issues with interference and/or contention and can achieve 100 Mbit/sec. Wired links constrain camera placement

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<sup>313</sup> Interview with DTIS staff.

<sup>314</sup> Bulwa, Demian. “San Francisco security cameras’ choppy video,” *San Francisco Chronicle*, January 28, 2008. Available at <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/01/28/MN37TKH6O.DTL&hw=San+Francisco+security+cameras+choppy+video&sn=001&sc=1000>.

<sup>315</sup> Additional storage would allow the CSC system to store footage that is at a higher rate and it would also allow for less compression of the images. This would result in footage that has fewer gaps in time and motion and also footage that has an increased post-compression resolution (from less loss of the data).

options—either they must be installed at existing connection points or money must be allocated to run new wires. The use of wired links generally costs more than wireless links. However, if the City wishes to use wired links for added capacity, it could reduce costs by utilizing its substantial existing fiber network infrastructure<sup>316</sup>.

All wireless camera links are on a special state/city police data channel and not in the ISM band. This restricts access to the network to only those individuals that have access to the state/city wireless channels rather than the public at large. Wireless links operate using a 4.9 GHz wireless channel between the subscriber (camera) and first hop switch/router (repeater). The wireless links that bridge the repeaters with each other operates at 5.8 GHz (see Figure 4). Wireless links operate at a maximum of 10 Gigabits/sec, with rates closer to 5 Gigabits/sec in practice due to interference and access contention in the wireless channel. One feature of using wireless last-mile links is that it allows for the freedom to place cameras anywhere that they can be mounted. This allows for quick deployment and relocation, if necessary<sup>317</sup>.

The security of wired links is greater than that of wireless links. The broadcast nature of wireless links allows entities other than those authorized to use the links to “overhear” or to send information on these links, making them less secure than their wired counterparts. Wired links are on a protected line, allowing only those entities that are physically connected to the line to overhear or send information on the line. To enhance security, and to ensure only entities that are a part of the City’s CSC system can access the network, both types of links, wired and wireless, must use some form of encryption during the process of data communication (e.g., IPsec Triple-DES and WPA2).

Currently DTIS has plans to make all last-mile links wired, rather than wireless. This move away from wireless last-mile cameras to router links is presumably due to two factors (in addition to the goal of using existing infrastructure): first the maximum data for wired links is greater than that of wireless links. Second, wired links are less error-prone than wireless links, leading to fewer dropped frames and thereby potentially increasing the frame rates of the archived video data. Using wired links over wireless, however, limits the ability to deploy the cameras anywhere where there is no wired connection available.

The cameras receive power via a direct connection to a City power line, which runs through the City’s utility post where each camera is mounted. When a camera has a wired network connection, it is

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<sup>316</sup> Interview with DTIS staff.

<sup>317</sup> Id.

powered using the Power-over-Ethernet (PoE) feature. This feature allows the camera to receive power directly from the communication network cable to which it is connected<sup>318</sup>.

## **Back-end System**

The central base station in the current camera program consists of a Dell Power Edge 1950 Server running Milestone XP. This server stores the video data aggregated by the network. Certain camera sites have local aggregators for video data, which report information to the central base station. The backhaul link connecting the last hop routers/switch to the base station is wired.<sup>319</sup>

The camera footage is unmonitored. Pursuant to the 2008 changes in the CSC Ordinance, footage can legally be archived (or stored) for a maximum of thirty days. Currently, however, there is a lack of storage capacity, limiting archiving capability to a seven-day maximum. As discussed previously, this lack in archiving capability is not only due to the stress on the system to archive multiple days of collected video data, but also due to the frame rate (the number of images frames per second) of the video footage that is stored. Additional storage may allow video footage with an increased frame rate to be stored<sup>320 321</sup>.

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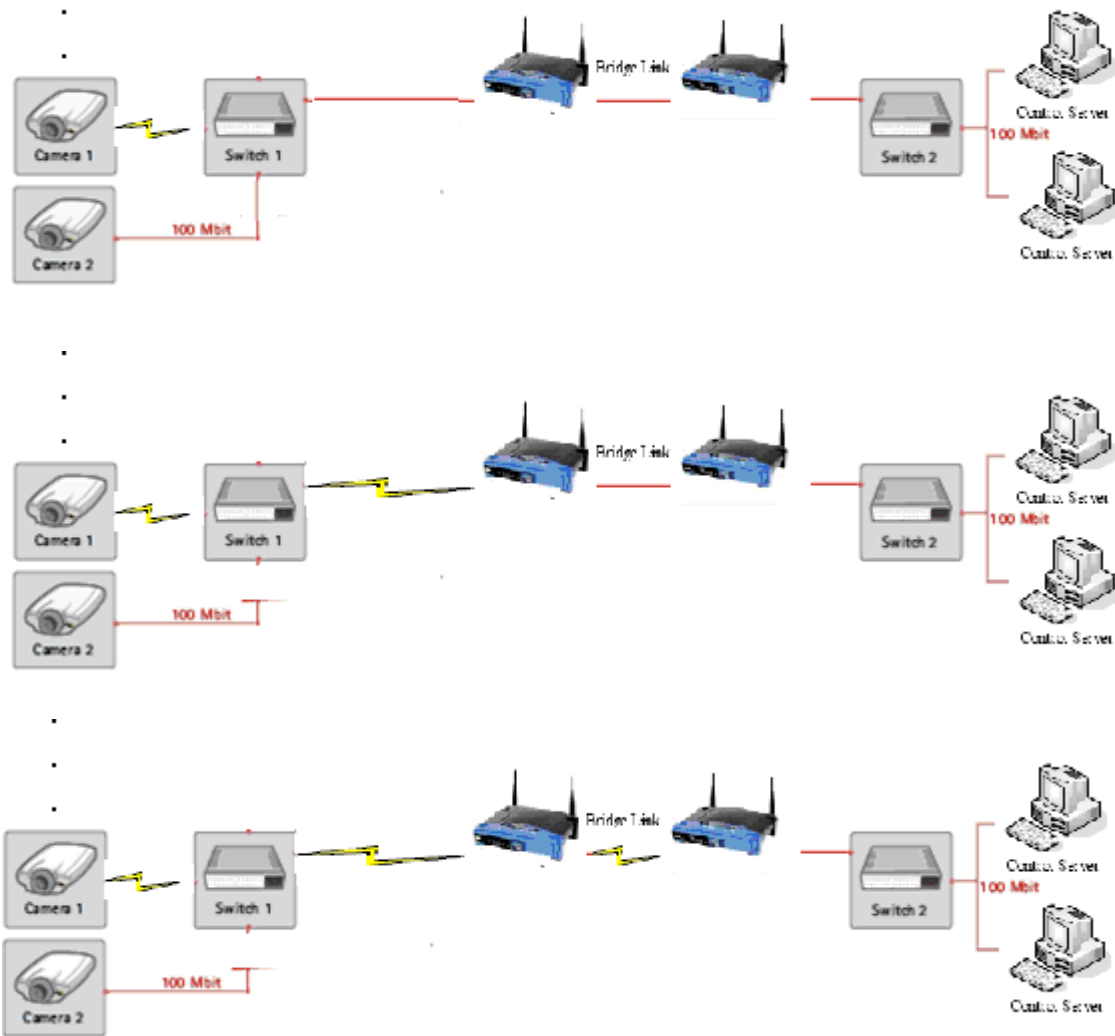
<sup>318</sup> Interview with DTIS staff.

<sup>319</sup> Id.

<sup>320</sup> Id.

<sup>321</sup> Id.





**Figure 5: City camera system architecture with subscriber-switch/router and backhaul links from routers to the control server (base station)**

It is possible that the frame rate of the archived video data is being decreased further by frame reception problems caused by the network. Specifically, end-to-end errors from the point of collection of the data (the cameras) to the point of aggregation of the video data (the base station server) could cause particular frames of video data to be dropped. The effect of this would be that the rate of the video data that is stored (i.e., number of frames reported per second) would drop.

### *Comparison of San Francisco's CSC system with Other Cities' Camera Systems*

We now briefly highlight a few key differences, in terms of the system architecture, which we came across when conducting a site visit of Chicago's camera system. Chicago's cameras (Pelco Spectra IV) do not have as high a resolution as most of the cameras in use in San Francisco. By comparison, San Francisco has state-of-the-art cameras, many of which are capable of delivering anywhere between 3MP and 5MP images. Nevertheless, Chicago is able to leverage the number of cameras it has as well as the real-time, active-monitoring capability of the camera system to effectively monitor the camera site location at full-frame rate (30 FPS) and to also store all of the information collected for a period of fifteen days. In comparing the architecture of the two City systems, we believe that Chicago more comprehensively considered the trade-offs of image quality (in terms of resolution), network capacity, and the amount of network storage required to information delivered at high frame rates. Specifically, as camera resolution increases, there is a need for higher capacity networks as well as additional storage space<sup>322</sup>. Although San Francisco uses high-resolution cameras, its network capacity is limited and storage capacity severely limited.

San Francisco must now temper how its system develops in the future by ensuring adequate consideration of the impacts of any future design changes on the existing system architecture. This will help to ensure that the utility of the camera system is preserved as the system develops. As an example, if San Francisco intends to add real-time, active-monitoring capabilities to the CSC system, the City should ensure that the system is capable of working in real-time—perhaps even at an increased frame rate—and should consider using PTZ cameras rather than fixed cameras.

### **Privacy-Enabling Suggestions**

Public video surveillance often elicits multiple privacy concerns. This is certainly true in San Francisco, where privacy concerns dictated the limitations placed on the design of the system. The quantity of information captured by cameras, their compact form factors and sometimes inconspicuous deployment, the inability of the general public to avoid surveillance, and the potential to correlate the footage with personally identifiable information (PII) are only a few of the privacy concerns that are raised by public video surveillance.

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<sup>322</sup> Interview with Chicago Police Department Operation Disruption staff.

In this section, we give a general overview of technical and nontechnical solutions that can be used to address privacy concerns with public video surveillance. In making these suggestions, our goal is to attempt to preserve individual privacy when using surveillance tools while still maintaining the utility of the networked camera systems to deter crime. Our suggestions complement recent policy work conducted with the goal of offering regulations to protect individual privacy amid public video surveillance in cities in the United States<sup>323</sup>.



**Figure 6: A figure showing the background subtraction technique used in conjunction with a complementary technique (salient motion) developed by researchers at IBM applied to a human being moving in a camera frame<sup>324</sup>. Note that the pixels pertaining to the human being in the foreground have been identified and made red in the second image.**

We begin by discussing a few techniques that can be used to build solutions that abstract particular pieces or PII from collected camera images. These techniques include: background subtraction and masking, human detection and/or human face detection and masking, and track/position extraction. All of these techniques allow camera operators to observe or easily infer particular types of relevant human behavior in a captured scene while preventing individual identification<sup>325</sup> through visual obfuscation. We then briefly discuss potential concerns that arise when using these techniques.<sup>326</sup>

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<sup>323</sup> The Constitution Project. “Model legislation to implement guidelines for public video surveillance: A guide to protecting communities and preserving civil liberties.” May 2006. Available at [http://www.constitutionproject.org/pdf/Video\\_Surveillance\\_Guidelines\\_Report\\_w\\_Model\\_Legislation4.pdf](http://www.constitutionproject.org/pdf/Video_Surveillance_Guidelines_Report_w_Model_Legislation4.pdf).

<sup>324</sup> J. Connell, A.W. Senior, A. Hampapur, Y.-L. Tian, L. Brown, S. Pankanti, “Detection and Tracking in the IBM PeopleVision System.” Proceedings of the 2004 IEEE International Conference on Multimedia and Expo, 2004.

<sup>325</sup> It is important to note that these techniques can be applied during the use of real-time video monitoring, but can be removed in the instance where an incident requires investigation and individuals need to be identified.

<sup>326</sup> We note that the different techniques proposed should be used for purposes befitting the particular application. For instance, if camera operators would like to observe the actions of individuals while maintaining facial privacy for those

Background subtraction is a technique in which the absolute value of the difference of the pixel data in the first image captured by a camera and the current image (or the absolute value of the difference of pixel data in current image and the previous image) is taken to distinguish data in the foreground of an image (e.g., moving objects) from data in the background of an image (e.g., nonmoving objects such as a lamp post). Background subtraction allows a camera operator to observe human behavior but typically makes it impossible to identify specific individuals, including by race. General human detection and specifically human face detection uses advanced machine vision techniques to distinguish human bodies and/or human faces from the rest of an image. Masking accompanies these techniques, abstracting data associated with the detected. Masking removes (or sets to null) pixel data that is identified as corresponding to particular objects in the images captured by cameras (whether it is any object in the foreground or human bodies or human faces). Finally, track/position extraction involves the process of determining the position or the trajectory of any object that is identified as corresponding to particular objects (i.e., usually those objects that are masked). Using these techniques in combination helps to build solutions involving human data abstraction in which humans or any foreground objects are masked from view or solutions involving human track abstraction in which only particular movements of human objects are reported to the observers and stored.

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observed, they could use a human face detection and masking technique.

| TECHNIQUE  | POTENTIAL ISSUES   |
|--|--|
| <p><b>Background Subtraction and Masking</b>—This technique is very easy to implement (although there exist multiple different methods to implement it). The technique can sometimes abstract too much or too little information from the image.</p> | <ul style="list-style-type: none"> <li>▪ Foreground fading to background.</li> <li>▪ Ghost images that are detected as foreground, but do not correspond to any foreground image.</li> <li>▪ Objects are camouflaged with the background and then not detected as foreground.</li> <li>▪ Shadows, which are detected as a foreground object, although they are not a part of the object of interest.</li> <li>▪ Multiple objects are detected and masked and as a result, the image does not contain sufficient information to determine what is occurring.</li> </ul> |
| <p><b>Human Detection / Face Detection and Masking</b>—This technique requires advanced machine vision algorithms to implement. Primarily human information rather than foreground information is abstracted by this technique.</p>                  | <ul style="list-style-type: none"> <li>▪ Variances in the sizing of the bodies or the faces in the images captured by the camera can cause detection to fail.</li> <li>▪ Bodies or faces shown in profile can be difficult to detect correctly.</li> <li>▪ If bodies or faces are not vertically oriented in the image, they can be difficult to detect.</li> <li>▪ Items worn on the face (e.g., sunglasses) can cause face detectors to fail.</li> </ul>   |
| <p><b>Human Track / Position Extraction</b>—This technique varies in terms of implementation ease. All image information is abstracted to tracks or positional information of the objects of interest.</p>   | <ul style="list-style-type: none"> <li>▪ This technique often builds on one or more of the previous techniques, and experiences similar problems.</li> <li>▪ Tracks or position information can be highly error prone.</li> </ul>  |

**Table 2: Comparison of Multiple Image Techniques To Assist in Data Abstraction**<sup>327</sup>

In addition to visual privacy solutions, we suggest considering “triggered” surveillance techniques. One example of this type of surveillance utilizes gunshot detectors in conjunction with surveillance cameras. This technique allows for cameras to record and/or report only surveillance footage of a particular area where a gunshot is detected. This solution could capitalize on the City’s existing investment in ShotSpotter gunshot detection technology. Another example is automatic threat identification. This solution involves the use of cameras in conjunction with advanced analysis software (i.e., software that uses machine vision techniques) to automatically identify a potential threat and to

<sup>327</sup> M. Meingast, S. Pai, S. Wicker, S. S. Sastry, “Privacy in Camera Networks, A Technical Perspective,” Electrical Engineering and Computer Science Department, University of California, Berkeley. Technical Report, UCB/EECS-2007-94, July 2007.

only report and store video footage of the environment and people located where the threat is detected. As an example, system designers could allow the cameras to only report/store video footage when a camera indicates that a firearm is being brandished by an individual in the area where the camera is deployed.<sup>328</sup> Such techniques help to preserve the privacy of law-abiding citizens that would otherwise be in the constant purview of the cameras' gaze.<sup>329 330 331</sup> Should the City continue to use unmonitored cameras, these solutions could be used to flag certain recordings for review; in a monitored system, these types of detection techniques can alert a camera operator to a potentially concerning situation.

Finally, we suggest against the use of automatic identification techniques such as facial recognition. While we are aware that San Francisco does not currently use this advanced technique on its digitized video, we nonetheless suggest that the future use of the technique should be limited, if used at all. Besides today being a largely unproven technology, automatic identification of individuals undermines the ability of law-abiding citizens to remain anonymous in a public space. Additionally, if the CSC program is expanded to include active monitoring of live camera footage, we suggest that such use be tempered by privacy-enabling technical solutions such as the examples discussed previously. Such solutions help achieve varying levels of anonymization of individuals captured within the images captured by the cameras, thereby preserving privacy of law-abiding citizens to a greater degree. For a more detailed discussion of active monitoring solutions, please see Chapter 5.

## **Technical Specifications**

### *Camera Specifications*

[http://www.ipix.com/downloads/ae\\_specs/CV-D2000-DN.pdf](http://www.ipix.com/downloads/ae_specs/CV-D2000-DN.pdf)

<http://www.iqeye.cz/podpora/iqtechspec.pdf>

[http://www.iqeye.com/iqeye/images/uploads/File/Sales\\_Datasheets/700-750\\_Datasheet.pdf](http://www.iqeye.com/iqeye/images/uploads/File/Sales_Datasheets/700-750_Datasheet.pdf)

<http://www.allaboutvideo.com/PDF/Sony%20SNC-RZ30N%20specs.pdf>

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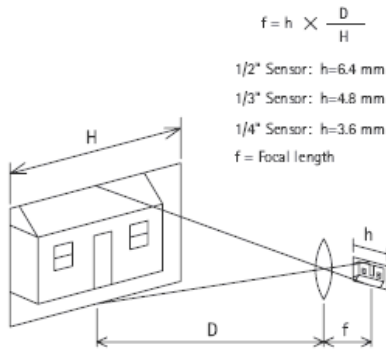
<sup>328</sup> See <http://www.videoanalytics.info/research-medusa.html>.

<sup>329</sup> Interview with Chicago Police Department Operation Disruption staff.

<sup>330</sup> Interview with DTIS staff.

<sup>331</sup> Interview with DTIS staff.

## Calculating the Visibility of Objects within a Camera's Gaze



Calculation - feet

What width of objects will be visible at 10 feet when using a camera with a 1/4" CCD sensor and a 4 mm lens?

$$H = D \times h / f = 10 \times 3.6 / 4 = 9 \text{ feet}$$

From the Axis.com website ([www.axis.com](http://www.axis.com))

## Estimating Storage Capacity Requirements

Calculation of the amount of data storage needed if data is stored at a constant rate: Frame Size in Pixels x 3 Bytes Per Pixel x Compression Ratio x Frames Per Second x 3600 Seconds x Hours of Operation Per Day x Number of Cameras x Necessary Data Archival Period

An estimate for the amount of storage needed for San Francisco (Assuming the use of 70 new 5.1 MP cameras reporting data at 12 frames per second 24-hours per day and an archival period of 30 days):

$5100000 \times 3 \times 0.8 \times 12 \times 3600 \times 24 \times 70 \times 30 = 26.6499072 \text{ E } 15 \text{ Bytes} \approx 23.67 \text{ PB}$  (which is an extremely large amount of storage).

