



Report

To:

From: Avenue Consultants

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Subject: UTA Video Security System Center Feasibility Study



This report provides documentation on the Feasibility Study performed on the subject of Video Security System Center for the Utah Transit Authority. This includes a review of existing literature on existing centers at transit agencies in the United States and a discussion on common characteristics of such centers. The study methodology and data collection process involving existing Video Security System Centers is detailed. Finally, a discussion of the data gathered during this study is given.

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1 INTRODUCTION

Traffic operations centers (TOC's) are a common fixture throughout the United States within the operations of larger transit agencies. TOC's utilize video monitoring for the purposes of traffic observation, direction and decision making with transit-related situations. As a result, many transit agencies utilize a surveillance network consisting of many closed-circuit TV cameras collecting visual data on a constant basis. While intended for traffic analysis and management, the visual data provided by transportation management systems and their camera networks can provide useful information for law enforcement and other agencies. Numerous agencies have found that general crime prevention and safety concerns in transit systems have many intertwining needs, which can be met through video surveillance (Schulz and Gilbert, 2011). Video monitoring can be utilized by transit agencies and law enforcement for the purposes of security surveillance, identification, and mitigation of criminal activity, and investigating suspect activities or claims. Video monitoring at a transit agency is often managed through a Video Security System Center (VSSC).

The Utah Transit Authority (UTA) currently operates an extensive camera and surveillance system, consisting of cameras on UTA facilities, buses, and trains. However, UTA does not currently utilize a centralized VSSC to specifically direct and manage the camera system. Avenue Consultants was approached by UTA to research and identify common characteristics of other VSSC's in the United States, with the goal of providing data which UTA could utilize in the planning and development of a VSSC for their own use. In order to determine basic characteristics and details present in VSSC's, an Avenue research team studied transit agencies throughout the United States, identifying examples of agencies that utilize a type of VSSC within their operation. The research team then reached out to a number of these identified agencies inquiring for information about each agency's VSSC. Five agencies responded back to this request. These agencies were then questioned about the various details and characteristics of their VSSC. A survey was used to collect data that was split into three sections – general details, center employee details, and cameras, software, and data use. In some instances, the survey was sent to the transit agency and filled out by a representative. In other cases, a video interview was conducted with an agency representative and the survey filled out with responses and discussion points gathered during interviews. This report is a compilation of the survey and interview results gained from the five agencies, reflective of conditions and characteristics that may be found in VSSC's across the United States.

2 LITERATURE REVIEW

This literature review outlines research on existing Video Surveillance and Operations Centers, their characteristics, common practices, and other details, with the intent of assisting UTA find effective means of developing a VSSC. While significant research and knowledge exist on the study of TOCs and other traffic management operations, there has not been as great a degree of research into specialized VSSCs. Numerous factors are involved in the creation of a VSSC, with questions on the best practices involved in developing a VSSC that will be effective in its role while also remaining cost-effective and efficient in operation.

Characteristics of Video Security & Surveillance Centers

A fundamental aspect of a modern Traffic Operations Centers is the utilization of real-time observation to effectively monitor and control traffic observations. Existing TOCs maintain extensive surveillance systems made up of CCTV camera networks, providing immediate visual data to traffic controllers. Data from surveillance

networks is then used to make effective communication responses to transportation decisions. Video surveillance and the data it provides has proven beneficial to transit agencies. The visual data gathered by TOCs also proves useful for other purposes, in particular for the use of video surveillance and security.

Whether originating from a specialized VSSC or a standard security system with a transit agency, it is common for video monitoring of transit systems to be used for security purposes. A study into the use of video surveillance by transit agencies found that over 90% of such agencies utilize their monitoring system for prevention of vandalism and other criminal activity, investigation of injuries, assigning fines for traffic violations, or to defend themselves against claims (National Academies of Sciences, Engineering, and Medicine, 2018). The presence of cameras alone can work to mitigate criminal activity. One study has found that while having cameras in certain areas is not a guaranteed deterrent against criminal action, the presence of security cameras has been associated with a reduction in crime of up to 13% (Ratcliffe et al. 2009). Considering the benefits of video surveillance and in lieu of the ability of collect visual data through existing traffic monitoring networks establishment of a VSSC offers an effective solution for security monitoring.

VSSCs are known by various designations. When operated by a transit agency, they simply may be called a video surveillance room or video center. They also may be known as an operations center, or security command center (RTD-Denver, 2020). Some VSSCs are run directly by a law enforcement agency; these are often known as Real-Time Crime Centers (RTCC's). They are also known as "Fusion Centers," "Intelligence Centers," or "Information Analysis Centers" and other titles (Monahan, 2010). RTCC's are designed as information and technology hubs for police operations. Data and information from networked cameras and tracking systems are fed back to an RTCC where analysis and response takes place. These hubs also serve as data mining centers to explore historical data and make decisions on potential criminal activity in the future (Atlas of Surveillance, 2020). The scope and actions of these centers varies, ranging from traditional public monitoring to counterterrorism operations, but many of their basic functions bear resemblance to other VSSC's not operated by law enforcement agencies. (Monahan, 2010).

When establishing a VSSC, several questions may exist about its basic structure, operations, staff, and cost. These questions include:

- What are the technology requirements of a VSSC?
- What are the facility and infrastructure requirements?
- When does a VSSC typically operate?
- What will its purposes and goals be?
- Who is staffed at a VSSC?
 - What are their needed skills and qualifications?
 - Full-time or part-time?
- Where does a center receive its funding?
- What is the cost of operating a VSSC?
- What are the benefits stemming from this operation?

The answers to these questions depend on the particular needs of a VSSC and its operating agency. Implementation and operating costs for a VSSC depend on the size and scope of ability it will hold. Starting costs for the RTCC in New York City were roughly \$11 million, but smaller VSSC's can be started and maintained for significantly less, often in hundreds of thousands of dollars (Atlas of Surveillance, 2020). The City of Ogden RTCC maintains a slightly smaller system than many transit agencies or large agencies for video surveillance. It is rolled into the police department's 'support services' division which had a total budget of \$1995350 in 2020; the RTCC accounted for a smaller portion of that amount (Ogden City, 2020). The City of Detroit was allotted \$4 million for the expansion of their RTCC with additional facilities (Gross, 2019). Funding for VSSC's can be received from several sources. Private donors have given significant contributions to Surveillance Centers in the past, and cost can be mitigated through donations, government funding, and subsidies (Atlas of Surveillance, 2020).

A key aspect among existing TOCs and their networks is the centralization of systems; centralization is also beneficial to a VSSC. Centralizing the controls of a video surveillance system with a widespread network of cameras allows for a team of operators to monitor extensive systems across a large area, identify potential incidents more quickly, and disseminate information to law enforcement or other agencies rapidly. Active monitoring techniques, cloud computing, and modern telecommunications allow for a VSSC to complete these functions with increasing effectiveness and speed.

Despite increases in technology and its capability, human operators remain vitally important to the operations of video surveillance. The number of employees required by a VSSC varies based on the size of the agency and its needs; small municipalities may only require a few staffers, while large transportation departments or law enforcement agencies may require a team of different employee types. The employee positions of surveillance centers also vary depending on location and needs of the agency. However, several types of employees can commonly be found working at a VSSC. These include the following (Arizona State Troopers, n.d., and Ogden City PD, 2017):

- Sworn Law Enforcement Officers
- Video analysts (Full and/or Part-time)
- Part-time or semi-retired Law Enforcement Officials
- IT Technicians
- Traffic Operations Engineers/Managers

Some VSSC's are full-time operations, with 24/7 monitoring and staff presence. Smaller agencies may operate a VSSC only during working hours or during hours of transit operations. Again, the hours that VSSC is actively monitoring conditions depend on the specific needs and tasks of its operating agency.

Notable Existing Surveillance Centers

Study into existing VSSC's around the monitoring United States reveals the diversity in implementation and methodology utilized by these centers. Different agencies use various methods of administration, technology use, and process implementation based on needs of a particular area. Some VSSCs work within a larger TOC or transit agency while others are managed directly by law enforcement agencies, or they may be managed through different means. These centers also may vary in their title and target goals. Despite these differences, they are

typically based around utilization of video data for surveillance and security. The below sections contain brief descriptions of several different agencies with a designated VSSC or video system.

- Ogden, Utah: Ogden Area Tactical Analysis Center. Formed in 2011, staffed by civilian and law enforcement officers. Manages over 1000 security cameras in addition to mapping software, license plate readers and imaging software (Atlas of Surveillance, n.d.).c.
- State of Arizona – Traffic Operations Center. Jointly implemented between the Arizona Department of Transportation and several other state and federal agencies. Based in a control center utilizing numerous video monitoring screens and displays showing weather conditions and traffic speeds. Center is monitored over full 24-hour days by 15 operators over varying shifts. Video monitoring system is used to identify and respond to incidents. Works in tandem with and receives training from law enforcement officers on procedures and methods. The center broadcasts its video monitoring to several TV stations to make video publicly available. Not solely a security center, but an example of closely working with law enforcement for video monitoring (ADOT; Arizona State Troopers)
- Austin, Texas: Austin Regional Intelligence Center – Staffed since 2010. Maintains a network of about 1,000 advanced security cameras throughout the city. Holds jurisdiction across 10 counties. Analytics hub that gathers, analyzes, and shares threat information. Lists general crime, suspicious activities, counterterrorism, and public health among key focus areas. (Atlas of Surveillance; Austintexas.gov).
- New Orleans, Louisiana: Real Time Crime Center – Operated by the New Orleans Office of Homeland Security. 24/7 center provides real-time information to officers, traffic information, emergency management, monitoring of illegal dumping and other criminal activity (City of New Orleans).
- Dallas DART Police: The Dallas Area Rapid Transit (DART) Agency operates an extensive camera network in conjunction with the DART Police Department (police officers designated to work on DART properties) to maintain a safe transit system (DART Police, 2022). The agency maintains about 7,550 cameras throughout its system for active monitoring and recording (Miles, 2021). The agency also maintains a “DART Say Something” app in conjunction with the police department allowing users to report hazards or illegal activity (DART Police, 2022).
- Denver RTD Security Command Centers: The Denver Regional Transportation District (RTD) maintains two Security Command Centers (SCC) for monitoring live video feeds, taking emergency calls, and relaying emergency information to the RTD police and security force. The two SCC’s jointly employ 23 dispatchers and managers who operate the centers all-hours. The centers operate in a similar manner to a 911 dispatch center for responding to emergencies. The SCC’s and the RTD police can also take information from a “Transit Watch” app the public can use to report information without calling. The SCC’s can also reach out to local police for emergency response if needed (RTD-Denver, 2020).
- Chicago Transit Authority Video Surveillance Room and Control Center: The Chicago Transit Authority (CTA) maintains a specified video surveillance room with multiple displays for use by police and CTA

security personnel to monitor incidents and identify potential hazards. The monitoring system is made up of more than 32,000 cameras in rail stations and CTA vehicles. In addition, the CTA control center can also access live camera feeds and is staffed 24/7. The City of Chicago and other public safety organizations have access to the CTA monitoring system as well, allowing for visual information to be disseminated more quickly between entities (CTA, 2022)

Many other transit and law enforcement agencies around the United States maintain and operate a VSSC or similar control center for video monitoring systems. Some other notable examples include Phoenix (Valley Metro), San Diego (MTS), Southeast Pennsylvania (SEPTA), and Portland (TriMet), Sacramento (Sacramento Real-Time Crime Center), among others. Many examples exist of video monitoring systems and the variations in operation that can be found.

Active Surveillance Monitoring

Active and passive video monitoring methods may be utilized by a VSSC. Active monitoring utilizes advanced video technology to identify, track, and record activity as it occurs. Active systems can be combined with telecommunications to quickly communicate alerts or other information throughout the system, as well as using cloud computing to collect and store video data. Video can be wirelessly uploaded and disseminated through networks for analysis and decision-making. The advances of cellular networks and cloud technology allow active systems to communicate information directly to transit users and the public. Many transit VSSC's can both receive and share information with the public with cellular apps; users may report suspicious activity or known hazards, and the VSSC can communicate information on potential hazards to all users when needed (DART Police, 2022). Passive monitoring techniques, where video data is viewed and analyzed as it uploads, do not offer many of the advanced capabilities of active monitoring. Research has found that active monitoring systems have a larger effect on improving security than passive systems (Socha and Kogut, 2020). However, utilizing a combination of active and passive monitoring within a video surveillance system has been found to offer the best balance and capabilities of both (Cecil, 2006).

Numerous challenges are created when attempting to successfully monitor video data in an active system. Image quality of cameras may be inhibited by light conditions or bad weather (Xiyang, 2013). Within a network, active monitoring can greatly increase the amount of traffic running through the system. In situations where video is collected, a large amount of storage is required for the video data. Passive monitoring systems do not require as much storage or create increases in network traffic but do not have the same capability to break down and disseminate data (Cecil, 2006 and Chen, 2020). Other issues can be found in methods of data collecting and analysis. Solely relying on human operators eyeballing live-feed screens for all video monitoring may lead to miss-detections of important incidents (Mehboob, et al. 2018). As a result, numerous video security systems and software utilize automated tracking algorithms of movement or suspicious activity to detect incidents (Mehboob, et al., 2018; and Durque et al., 2006). These automated programs allow for a smaller staff in an operations center to manage much greater amounts of video and traffic data than would be possible with only human operators. While limited in some capacities, semi-automatic and automatic systems allow for less demand on human ability for security monitoring (Durque et al., 2006)

The use of unmanned aerial vehicles (UAVs), more commonly known as drones, for live monitoring is an expanding possibility for video surveillance. Utilizing drones to create an ATSS (Airborne Traffic Surveillance System) has been researched and implemented for the use of traffic monitoring and direction by transit agencies (Srinivasan, 2004). Drones allow for a large area to be quickly viewed and analyzed from a look-down perspective, providing viewpoints not possible from traditional CCTV and monitoring cameras. The use of drones for video security by agencies has not been as well-explored as utilizing traditional camera systems. Previous research has also identified that drone surveillance may encounter legal complexities and concerns from the public (Cavoukian, 2012). However, the use of UAVs for certain security activities may be a viable possibility for VSSCs to gather different views of public spaces.

Benefits of VSSC Operations

The benefits provided by active video surveillance are of great use to transit agencies and law enforcement for the purposes of security and mitigation of potential hazards. A major benefit of active video surveillance is providing video for use in legal concerns. Video data provides visual proof during incidents that can be used for addressing legitimate claims while refuting false ones. This can protect a transit agency or municipality from unjust or frivolous lawsuits (Wren, 2007). Previous study has found that many transit agencies have used video surveillance primarily as a risk management tool against issues such as fare evasion and fraudulent claims (Schulz and Gilbert, 2011). Utilization of a VSSC allows transit agencies to continue the use of video against fraudulent claims and to protect themselves from litigation, while still providing visual monitoring for security purposes and law enforcement.

Many of the basic benefits of video operations are involved in the ability to identify and mitigate criminal activity. Existing VSSCs have utilized video monitoring along with other technology to assist in identifying perpetrators of crimes such as robberies, vandalism, and large-scale threats such as terrorism (Winkler and Rinner, 2013). VSSCs have also been found to utilize video monitoring in association with other technologies and agencies to combat crimes such as fraud and kidnapping (Atlas of Surveillance, n.d.). The recorded video data gathered by surveillance may also be used by law enforcement for investigatory purposes, where law enforcement utilizes video data to identify and pursue litigation of criminal perpetrators. These uses illustrate the wide range of criminal activity that a VSSC can identify and monitor (Socha and Kogut, 2020).

In addition to identifying crimes or suspicious activity that has already occurred, the video surveillance hardware utilized by a VSSC can act as a deterrent for future criminal activity. Past study has suggested that CCTV systems have an impact on decreasing the occurrence of crime in urban spaces (Piza, et. al., 2019; and Socha and Kogut, 2020). However, if the presence of a monitoring system is not widely known, there may not be a decrease in crime. Still, video monitoring proves useful in identifying and tracking criminal activity. Video monitoring can also monitor for instances of less noticeable criminal activity; at least one VSSC monitors for illegal dumping by citizens (Atlas of Surveillance). A centralized VSSC can monitor illegal or suspicious activity across a wide area with many different cameras and viewpoints, using gathered data to alert law enforcement and direct them to incidents.

A VSSC can utilize video monitoring during times of emergency or uncommon events. VSSC Operators may assist in coordinating emergency response to weather events, natural disasters, or public emergencies by

providing visual data to guide and direct responders while identifying hazards. An RTCC in New Orleans has been found to support public safety operations by guiding emergency services away from hazards during times of flooding or fires (Atlas of Surveillance). The visual data provided by a camera network and operations center can prove highly valuable in assisting during times of emergency where public safety is threatened.

Controversy and Litigation Potential

Despite the significant benefits that exist for municipalities and law enforcement using video monitoring, significant controversy and potential for litigation does exist regarding the existence of VSSCs. Numerous organizations including the ACLU and local organizations have criticized certain VSSCs of infringement of rights and creating social inequities in crime management. Other critics site VSSCs gathering of data and visual monitoring of public spaces as violations of personal privacy and a misuse of technology (Atlas of Surveillance, 2020).

A report from the National Academies Press has found that while video surveillance in public areas is constitutional, certain privacy risks may exist that may bring legal action in certain situations (2018). As a result, agencies must take care to have knowledge of statutes on video monitoring and if certain areas or personal situations are prohibited by state or federal law. The case of privacy rights has largely been left to state governments to decide; in lieu of this, transit agencies should adhere to standard protocol for video monitoring and have knowledge of what may be inappropriate regarding video monitoring. Significant previous research has opined that when video surveillance in public areas is continuous, it typically will not present significant litigation potential (DiSalvatore, 2017).

It is paramount that the agencies responsible for the maintenance and improvement of the camera system utilized by a VSSC ensure that the system is working properly. Some VSSCs and camera monitoring systems have been criticized for potential lack of reliability. In one example, the monitoring system of the DART (Dallas Area Rapid Transit) has experienced instances where cameras that would have captured criminal incidents or accidents were not functioning at the time. This created questions about the reliability of a camera system that had been installed at great expense (Miles, 2021). To prevent such incidents, VSSCs should regularly check for system breakdowns, outages, or equipment failure. The potential for accident or incident (and following litigation) exists where a VSSC may not capture needed video due to system failure. Previous research has also found that the impact that cameras have on crime as a deterrent may fade over time; it is essential that regular assessment of the impacts of cameras in public places be performed, adapting the system to changes in trends and existing conditions as needed (Socha and Kogut, 2020). Proper maintenance and regular assessment of system effectiveness ensures that video surveillance systems operated by a VSSC will be effective in collected the visual data needed for security purposes.

3 STUDY DETAILS AND METHODOLOGY

This study aimed to gather details on VSSCs by gathering data on details of their operation using a survey tool and related interview process. Background research and analysis on VSSCs and transit agencies was performed to identify agencies with VSSCs that could be contacted. Numerous transit agencies across the United States utilize VSSCs or similar operations, in addition to many police departments and security agencies that operate

VSSCs as well. While many different agencies were initially considered, nine were ultimately chosen and contacted. Contacts were identified for each agency and emails were sent to these contacts. Eventually, five agencies responded to these emails and were focused on during the study. Each of these agencies are listed below with their location:

- San Diego Metropolitan Transit System [San Diego MTS] (San Diego County, California)
- TriMet (Portland Metropolitan Area, Oregon)
- Valley Metro (Phoenix Metropolitan Area, Arizona)
- The Southeastern Pennsylvania Transportation Authority [SEPTA] (Philadelphia Metropolitan Area, Pennsylvania)
- Ogden City Police Department (Ogden City, Utah)

Five of these agencies are major transit agencies in urban areas throughout the United States. The Ogden City Police Department, which utilizes a VSSC, was contacted and included in this study due to geographic proximity to UTA, familiarity between some employees of each organization, and the applicability that their VSSC provided to this study. Overall, these agencies provide a good overview of different transit agencies operating VSSCs and have their own similarities and differences in comparison to UTA.

To gather data effectively for this study, a google form survey document was created with 43 questions divided into three sections: General Details, Center Employees, and Cameras, Software, and Data Use. The answers to the questions in these sections would provide a good overview of the applicable details for this study. A link to the survey form was generated and sent to each agency within the initial contact email. The option was given to each agency to either fill out the survey at their own volition, or to perform a virtual interview with the Avenue research team where the survey questions would be discussed and answered within the interview. Ultimately, 3 agencies agreed to perform interviews with the research team, these were TriMet, Ogden City Police, and SEPTA. San Diego MTS and Valley Metro each filled out the survey outside of an interview.

The survey responses (whether filled out independently or within an interview) were submitted through the google form and then gathered within a google drive. Responses could then be compared to identify what characteristics and details are common to VSSCs at different agencies throughout the United States. Difference between agencies in how they approach factors such as staffing, management, VSSC structure, camera technology, and others could also be identified from these answers. Responses were compiled from the google drive into a word document for this comparison. The data gathered from these agencies could help UTA plan for what can be expected when developing a VSSC. Results from the survey are detailed in the following sections.

4 STUDY RESULTS

GENERAL DETAILS OF STUDIED VSSC'S

While some operations and functions of VSSCs may be very similar, differences are also present within the basic details of these centers. While all the researched centers fall within a type of VSSC, the official titles of the centers vary. The table below displays each governing transit agency, title, and governing department within their agency:

Table 1. VSSC Titles and Departments

Transit Agency/Governing Agency	VSSC Title	Governing Department
San Diego MTS	Operations Control Center (OCC)	Trolley Operations/Security Dispatch
TriMet	Public Safety Operations Center	Security and Emergency Management
Valley Metro	Operations Command Center/Dispatch Control Center	Operations/Security Division
SEPTA	Video and Evidence Unit	Office of General Counsel
Ogden City Police	Area Tactical Analysis Center (ATAC)	N/A (Ogden City Police)

The differences in these titles reflect some of the variation present in VSSC structure that may be seen between centers. Within the survey, center representatives were questioned on details regarding VSSC location and backup operations. Each of these five centers operates out of a location on the property of their governing agency. Three out of the five agencies utilize more than one location for video operations (San Diego MTS, TriMet, and SEPTA). TriMet also maintains a redundant backup in case operations needed to be moved there. Some agencies (SEPTA and Ogden City Police) noted that in lieu of a backup location, center employees have the ability to perform most of their tasks remotely as needed, which likely reduces the cost of maintaining backup locations in addition to the primary location. See table 2 for a comparison of location responses between agencies.

Within their parent agency, most of the VSSCs were found to operate under a division of security or safety (transit dispatch, management, division, or police) or another legal operations department, as displayed in the table. VSSCs at transit agencies also often work in conjunction with Traffic Operations Centers and departments and will communicate with each other on potential issues or other factors.

Regarding the place these centers occupy within their parent agencies, at each VSSC, the manager or director of the center answers to another official within that agency’s chain of command. At a majority of VSSCs that were researched, managers answer to a Security Administrator or other legal operations office regarding video security, although titles for these positions vary. At the SEPTA Video and Evidence Unit the manager answers to the General Council Department. At the Ogden ATAC, the manager answers to the Ogden City Police Captain. The San Diego OCC director answers to the Security Systems Administrator, while at the Valley Metro OCC/DCC the director answers to either the Operations or Security Manager. The Public Safety Director at TriMet answers to the Director of Security and Emergency Management.

Budgeting information is important to the operation of a VSSC. However, each VSSC may vary in size and scale of operations, which affects budget and costs. Salaries may also affect the budget due to varying numbers of employees and job skill. Some center representatives did not have information on budgeting and other financial information as that data is not easily available to VSSC management in all cases. Some budgeting information was found, however. TriMet’s Public Safety Operations Center has an estimated annual operating budget of \$1,000,000-\$1,500,000 for Video Equipment and \$2,000,000 - \$2,500,000 for personnel, with a

combined estimate of \$3,000,000 - \$4,000,000 annually. Representatives from SEPTA’s Video and Evidence Unit estimate their annual budget at approximately \$3,000,000 annually (this number includes all costs, salary and otherwise). Ogden City’s ATAC has an annual budget of roughly \$700,000, with the ATAC director noting that salaries and benefits for personnel make up most of the budget. While different in some of its functions than a transit-based VSSC, the Ogden ATAC budget likely serves as an example of the finances required for a smaller-level VSSC. The annual operating budget for the other centers were unknown at time of the survey. The budget information gathered from TriMet and SEPTA would likely serve as an effective indicator of what may be expected at a typical transit based VSSC. It should be noted that representatives emphasized how these budgets are estimates as VSSC costs are often tied into other departments and operations within transit agencies, which can make retrieving an actual budget amount difficult. Some considerations to keep in mind regarding budget were shared by representatives; the TriMet representative noted that salaries are difficult to estimate as most employees that work with the VSSC there are also employed in other departments. SEPTA representatives noted that the video and evidence unit is part of the general council department, and their budget is wrapped into the budget of that group. See table 2 for comparison of budget responses alongside location information.

Table 2. Budgetary and Location Information

VSSC	Backup Location	Redundant Location	Annual Budget (Estimate)
San Diego MTS OCC	Yes	No	Not reported
TriMet Public Safety Ops. Center	Yes	Yes	\$3 - \$4,000,000
Valley Metro DCC	No	No	Not reported
SEPTA Video and Evidence Unit	Yes	Remote Function	\$3,000,000
Ogden City Police ATAC	No	Remote Function	\$700,000

Operations and functions that a VSSC performs are dependent on numerous factors pertaining to that center’s specific requirements as directed by its governing agency. Survey responses in this study reveal that VSSCs have some differences in their function, but also share many basic operations that help define what a VSSC is. Survey responses were divided into primary, secondary, and tertiary categories based on how often they were selected by representatives as being part of operations. Primary functions were found to be most common among responses from agency representatives as the principal task undertaken at VSSCs. Secondary and tertiary were subsequently found to be less common. Despite some functions being more common than others at VSSCs, and depending somewhat on each center’s specific characteristics, these functions were commonplace among all. See table 3 below for listed functions.

Table 3. VSSC Functions and Operations

Primary Functions	Secondary Functions	Tertiary Functions
Emergency Response and Management	Transit Control and Direction	Active Service Calls and Requests for information
Crime Prevention, Response, and Investigation	Maintenance of System	Oversight of video system (camera placement, budgeting, etc.)
Video Surveillance		Claims and Litigation

An important takeaway from the responses gathered on VSSC functions is the ability of VSSCs to perform a number of different duties and utilize their cameras and visual data for varying tasks. Generally, operations related to emergency management, crime prevention, investigation, directing responses to incidents, and general surveillance are the most common operations across VSSCs, while other operations such as transit control, maintenance uses, information requests, etc., are present but less common across VSSCs. It should be noted that at many VSSCs there may be some overlap between the functions and operations listed in the table. Other operations may be carried out by VSSCs that were not included in responses. As discussed later in this report, other agencies may have access to VSSC systems and data, and different agencies may use resources from the VSSC within differing operations or functions.

As was gathered from the question of operations, video surveillance and the use of a camera system is nearly universal across VSSCs, regardless of other differences between one center to another. However, the extent to which the camera system is utilized during operations, and the hours of operation of a VSSC generally, will vary according to perceived needs. The San Diego and Valley Metro centers have complete operations on a 24/7 basis for all days of the year. The Ogden ATAC and SEPTA Center are fully operational during daytime working hours and have on call response if needed outside of working hours, with some extra coverage during special events (sporting events, concerts, etc.). The TriMet center has limited 24/7 operations, with more extensive operation during normal working hours and limited operation outside of working hours. While not all VSSCs were found to operate during all hours, it was gathered from responses that transit agency VSSCs will typically have some sort of partnership or other agreement with local law enforcement that allows law enforcement agencies access to the camera system and stored video data. As a result, law enforcement outside of the VSSC may use the system to a greater extent than the VSSC itself. SEPTA's system allows the police to utilize the cameras for 24-hour operation. Other centers note that transit police or other security personnel within the agency may have access to cameras for any hour usage. At some centers, such as at TriMet, security personnel utilize the camera system for monitoring and work in conjunction with the VSSC director when responding to incidents or investigating past issues.

In managing operations across large camera systems and coordination with other agencies, effective centralization of system control is an important aspect and benefit of VSSC operations. Centralization involves the physical location of a VSSC within its system. Despite rapid increases in technology and the ability to

communicate over digital methods, physical location still greatly influences the effectiveness of an operation, and all of the VSSCs researched in this project had a centralized physical location where operations take place and all aspects of VSSC function are managed. Most of the centers chose their current site for video center operations based on convenience of location and proximity to other departments within their agencies. The San Diego center operates within the main trolley building and agency headquarters. Valley Metro’s Dispatch Control Center and security division is in the same space as their Operations center, separated by a glass partition. The TriMet center operates out of the Public Safety Office, specifically for the access and use of cameras. SEPTA’s center operates in the general council department as a part of greater legal operations. The Ogden ATAC operates at an on-site location facility of the Ogden Police Department, allowing for public access (the ATAC representative noted they experience a significant amount of walk-in traffic from the public) and convenience as their work is associated with the greater Police Department. Overall, it was found that VSSCs are commonly located within a facility belonging to their parent agency, usually near other security, safety, operational or legal departments. This proximity allows for quick communication between the VSSC and security/safety operations as video security is used for these purposes. Sites are also chosen where they can be accessible to employees from other departments within transit agencies quickly. One interesting note arose from the Ogden City Police ATAC interview, where the ATAC director noted that although their current location was convenient for public access, a larger space would be useful. They suggest that a planned VSSC should overestimate how much space is needed, as future growth and equipment may exceed the initial space capacity.

VSSC EMPLOYEE DETAILS

Agencies were questioned in the survey about their employee structure and employee titles found within the center. Reported VSSC supervising roles and employee titles include the following seen in table 4 below.

Table 4. VSSC Employee Titles

Transit Agency/VSSC	Supervisor Titles	Employee Titles
San Diego MTS OCC	OCC Supervisor, Dispatch Supervisor	Controller, Dispatcher
TriMet Public Safety Ops. Center	Crime Prevention & Data Analysis Coordinator	Security Officers, Public Safety Ops. Coord. (Future Role)
Valley Metro DCC	Unknown (not listed)	Train Controllers, Contract Security Officers
SEPTA Video and Evidence Unit	Video Unit Director	Video Manager, Technical Manager, Video Analyst
Ogden City Police ATAC	Center Director	Crime Analysts

These titles reflect the varying nature of each VSSC and the differences that may be seen in their operation and function. In some cases (such as at SEPTA or TriMet) specific employees control dispatches, monitor for security concerns, and manage camera operations. Other agencies such as Valley Metro have transit operators monitoring the system in addition to their normal duties of transit control. Despite differences in

employee type and title, each agency contacted in this study had some type of employee(s) who monitored the camera system looking for potential security risks and/or could retrieve previously recorded video for review purposes. Agencies will also designate a VSSC supervisor or director who oversees center processes. It was also seen at TriMet and Valley Metro that actual security officers are part of the center employee structure (whether employed directly within the VSSC or working in conjunction with it), though this was not the case at other centers. An important note gathered from response data is that employee structure varies significantly from center to center based on particular needs. It was not uncommon to find out from center representatives that their particular VSSC involved employees who worked full-time in the center and employees who shared work between the VSSC and other departments in that transit agency. This is particularly true of law enforcement departments and security; law enforcement and security departments at transit agencies will often work very closely with a VSSC and even station employees within the center, but technically their department is separate. Generally, the employee structure in any VSSC will depend on how the center is managed within its parent agency, the scope of employee responsibilities, and what duties will be handled by other departments.

Each center representative was asked if they could share a brief job description for their employees as a part of the survey/interview process. TriMet describes the role of video center employees and security officers as being the point of contact for law enforcement, working to utilize TriMet resources (cameras and surveillance systems) to aid in crime prevention. SEPTA Video and Evidence Unit employees retrieve video both electronically and physically (utilizing mobile and 'smart station' video) to review incidents. They also store and distribute videos (when needed) from multiple sources and locations. Crime analysts at the Ogden Police ATAC provide intelligence and analytical support to law enforcement. Analysts deliver captured information needed for law enforcement management, decision-makers, and front-line officers to better accomplish their duties. Ogden City analysts work in an environment based on a collaborative team, under the supervision of police administration, specifically at OPD, under the Commander of Support Services. The San Diego MTS and Valley Metro centers did not include job descriptions within their survey results, but it can be assumed that employee duties at these VSSCs are likely similar to the others. From these descriptions, it can be seen how VSSCs typically utilize employees that carry out similar duties and functions, but differences can be seen in more specific duties and how employees are structured. Regardless, monitoring of incidents, crime prevention, investigation, and coordination with law enforcement are typical responsibilities seen among VSSC employees.

The center representatives were also questioned regarding the shifts that employees at the VSSC work. From these responses, it was found that all surveyed VSSC centers have full time employees performing most duties. The Ogden City Police ATAC also has some part time positions in addition to full time employees. Only one of the surveyed centers is fully staffed (SEPTA) for all hours of operation; the other four centers base their staffing on hours of day and otherwise as needed. It is common for VSSCs to be fully staffed during daytime operations and peak hours, with lesser staffing or non-operation during off-hours. One important ability identified in survey and interview responses is that two VSSCs (the SEPTA Video and Evidence Unit and the Ogden ATAC) noted they have the ability to essentially function remotely if needed, due to the necessity of this type of operation during the COVID-19 pandemic and related workplace shutdowns. While it is currently not a requirement to function remotely in many locations, representatives from these agencies discussed how remote function remains valuable for their operation and that ability has been preserved. Remote operation capability allows for quick access to the system and the ability to perform certain VSSC duties during off-hours or when employees are not physically at the center (as discussed earlier, remote function can also serve as a backup

operation in lieu of operating a physical backup location). Representatives from the other VSSCs did not indicate if remote function was possible in their operations, but such ability could be very useful to VSSCs in the future.

Employee salary ranges were found to differ from between the different VSSCs. Valley Metro’s salary ranges from \$16-\$18 per hour depending on the position. TriMet employees at the Public Safety Operations Center are paid in a range from \$60 to \$110K per year, while the salary for video analyst employees at the SEPTA Video and Evidence Unit (who make up most of the positions there) \$70K per year. Crime analysts employed by the Ogden City Police have a high level of education and skill that commands a higher salary, though the exact number was not known at the time of the interview (it can be assumed for the purposes of this study that the range of salary at the Ogden ATAC is likely similar to that of TriMet and SEPTA). The salary ranges at the San Diego MTS VSSC were unknown as well. One difficulty that arises when examining salary of employees at VSSCs is that different employees will likely have varying salaries, with directors and supervisors commanding higher salaries than operators or video analysts. VSSCs may also require a higher or lower degree of education and skill from employees, which effects salary. TriMet’s range of \$60 to \$110K in salary a year is likely an effective example of the range of salary for VSSC employees, with higher skill and responsibility within the center corresponding to higher wages.

The amount of equipment utilized by VSSCs results in the need for maintenance, both physical and technical. Physical maintenance typically includes installing and repairing cameras and other monitoring equipment. IT maintenance covers maintenance and upkeep of software and debugging any issues with computers or system technology. The question was asked in the survey and in interviews if regular physical and IT maintenance occurs and how many employees are responsible for such maintenance. Representatives from all the interviewed centers confirmed that regular maintenance on the camera system does occur, though there are differences in who manages system maintenance and how many employees perform these duties. Three of the researched centers shared information on employees who perform regular IT and physical equipment maintenance. Valley Metro has two to three employees that maintain camera equipment and one to two employees that perform IT maintenance, all positions are full time. TriMet also utilizes full time employees for maintenance each designated for specific maintenance roles; two for IT maintenance, two for cameras, one for camera layout/planning, a 10-person crew for bus cameras, and another crew (unknown size) for train cameras. At the SEPTA VSSC center there is a crew of 15 to 16 employees in the communications and signals group who maintain equipment and work full-time positions. Representatives from San Diego MTS and Ogden City Police are unsure of the total number of employees that perform IT maintenance as those positions are handled by other departments within the agencies. It was generally found across the centers that there seems to be less awareness of who performs IT maintenance than physical maintenance. In conjunction with this, it was found that no VSSC studied in this project manages maintenance and upkeep (both physical and IT maintenance) internally. Maintenance positions are typically managed through the designated maintenance department of the parent agency, while many agencies have an IT department which oversees all IT-related tasks. These departments communicate with VSSCs on what maintenance is needed and performs any required maintenance tasks. See table 5 for comparison of maintenance details between VSSCs.

VSSCs can utilize the visual data recorded by cameras for both review and live-monitoring purposes. All VSSCs studied in this project utilized forms of video monitoring to some degree. It was found, however, that video is not always monitored live within a VSSC on a consistent basis. Interview and survey results revealed that some agencies utilize live monitoring regularly and others use it only as needed or for certain tasks (such as

investigative tasks). Despite not all agencies using live viewing, all VSSC representatives in this study stated that video is at least utilized for tasks such as special events, review of incidents, or investigative purposes. As a result, employees at these centers are required at some point to watch monitors as a part of their duties. The number of monitors and employees viewing camera feeds at the surveyed video centers varies from center to center. The Valley Metro OCC feeds are viewed live on a large wall monitor viewed by a minimum of two employees. The TriMet center has at least two employees monitoring camera feeds using one to two monitors. The San Diego MTS OCC shows video on three to six monitors which are viewed by all employees in the center regularly. There are 14 SEPTA employees viewing camera feeds on five Smart Stations and various assorted monitors with some fluctuation in who is watching the video. The cameras managed by the Ogden City ATAC are viewable on two monitors at each desk and one large wall monitor. The ATAC monitors are not watched constantly and are primarily watched during events. The number of employees watching monitors at the Ogden ATAC varies as needed, with up to eight at most.

Given the number of monitors that employees at video centers are required to watch at times, the question was posed to each agency on whether a rotation between employees watching monitors exists as a measure to prevent fatigue. Responses found that TriMet and SEPTA have a rotation among employees watching monitors for this purpose. The other agencies do not have employees monitoring cameras on a consistent basis, but on an as-needed basis and for review. Therefore, a rotation is not needed at these centers. Overall, it was seen from responses that a rotation among employees is only used by agencies that are constantly monitoring video and live feeds. As many agencies do not actively monitor video on a constant basis, a rotation is not needed. See table 5 below for comparisons between monitoring details of the researched VSSCs.

Table 5. Camera Monitoring and Maintenance Responses

VSSC	Camera feeds	Monitors	Rotation	Physical Maintenance	IT Maintenance
San Diego MTS OCC	All Employees	3 to 6	No	Unknown	Unknown
TriMet Public Safety Ops. Center	Min. of 2	Large wall monitor	Yes	3 – cameras 10+ buses/trains	2
Valley Metro DCC	Min. of 2	1-2	No	2-3	1-2
SEPTA Video and Evidence Unit	14	5 smart stations and other monitors	Yes	15-16	Unknown
Ogden City Police ATAC	8 if needed	2 desks, 1 wall	No	Unknown	Unknown

VSSC CAMERA, SOFTWARE, AND DATA DETAILS

Given their operational function of monitoring, recording, reviewing, and otherwise utilizing an extensive camera network for security purposes, knowledge into details of equipment used by and data gathered by VSSCs is of

great importance to understanding their overall function. Through the survey and interviews, VSSC representatives were asked numerous questions relating to the camera equipment and software utilized within their respective centers. They were also questioned about what data is actually gathered by cameras and how it is utilized. In a similar manner to employee and general details, VSSCs share many similar overall trends and characteristics regarding camera equipment and data. However, many differences are present, based on the size of the VSSC, aspects of its operations, specific equipment details, and other factors. These differences reveal the various directions and processes that a new VSSC may follow when being set-up.

An important detail regarding the size and scale of VSSC operations involves the number of cameras that the VSSC monitors overall. It was found during this study that the total number of cameras being monitored varies from center to center. SEPTA reported that they monitor a total of 32,233 cameras of varying types across their system. SEPTA cameras are found on buses, trolleys, trains, paratransit services, SEPTA facilities, concourses, and other locations. TriMet monitors 2,700 cameras across their system in Portland, on multiple transit systems. Both SEPTA and TriMet cameras are available in real-time, and consist of cameras at transit facilities, various other transit properties, bus cameras, and train cameras. SEPTA also includes some nontraditionally mounted cameras in their system, such as body cameras worn by transit officers, mobile cellular video for certain events, and pilot car cameras within their system. The Ogden Police ATAC has access to over 600 cameras throughout Ogden City but indicated they monitor 150 cameras more closely than the others due to locational factors (some cameras are located in high-traffic areas where more incidents may occur). The ATAC does not access cameras for live viewing but uses them for review purposes. The ATAC also utilizes 6 mobile camera trailers that can be placed in various locations as needed for monitoring of special events or other purposes. San Diego MTS and Valley Metro representatives did not know how many cameras in total are present within their system. In regard to specific camera types utilized by each agency, center representatives noted that a variety of camera types can be found within VSSCs. See the table below for a listing of VSSC camera types.

Table 6. Camera Types Utilized by Agency

VSSC	Number of Cameras	Camera Types
San Diego MTS OCC	Unknown	Fixed, motion and PTZ (Pan, Tilt, Zoom)
TriMet Public Safety Ops. Center	2,700	Trains and buses - fixed cameras, Platforms – fixed & 360-degree cameras, PTZ cameras are being installed (at least 2) at each location
Valley Metro DCC	Unknown	PTZ cameras
SEPTA Video and Evidence Unit	32,233	Mobile, cellular, PTZ, fixed, fish-eye cameras on elevated mounts, body cams (solely under the police department)
Ogden City Police ATAC	600+	PTZ and fixed cameras. 6 solar-powered portable camera trailers

These camera types show the variation that can be found in monitoring equipment managed by VSSCs. These differing camera types on multiple transit platforms and areas also show the wide area that VSSCs monitor across multiple systems. Multiple camera types also afford flexibility to VSSCs, as different cameras may be

suited for certain areas to present the best viewpoints (such as wide-angle fisheye lenses being used by SEPTA for cameras mounted in high locations). Ultra-flexible technology such as mobile cameras or cellular capture also allows VSSCs to place extra cameras during special events for increased security.

To manage these various camera types across large systems, the surveyed VSSCs utilize the following software for viewing and managing video footage:

- San Diego MTS - Avigilon,
- TriMet - Milestone video management (Xproctect)
- Valley Metro - UNK
- Ogden City Police ATAC - Avigilon and Verkada
- SEPTA - DTI, Gatekeeper, Genetec

As can be seen from the variety of software programs utilized for camera and technology management, numerous software systems exist which can be used for security management. It was noted that some agencies only utilize one system, while others use a combination of software systems. This may be due to different system or camera requirements dependent on each VSSC.

Many VSSCs, particularly those within transit agencies, manage cameras that number in the thousands. The placement and location of these cameras greatly contributes to the ability of each VSSC to effectively monitor different areas and vehicles throughout the transit system. Survey and interview responses from VSSC representatives revealed that the criteria for camera location and placement is primarily determined by a combination of input from the police and other security system administrators, along with VSSC managers. TriMet uses a holistic approach in the placement of their cameras and as such consult with various departments to determine what the camera's feedback should capture. Site-specific trends and a list of characteristics is also studied during this process and includes factors such as sight distance and potential. The Ogden City Police matches their camera locations with public and infrastructure protection and safety needs. The city is a partner in this process and helps to determine final placement. Valley Metro cameras are a part of the standard design criteria for platforms, park-n-rides, and light rail vehicles; cameras are placed in areas allowing a maximal field of view. The San Diego MTS Security Systems administrator determines camera placement with other MTS managers. SEPTA Police primarily determine camera placement through their system. Overall, it was seen that involving multiple people and/or departments in the placement of cameras ultimately helps these agencies develop the most coverage and design of cameras throughout the system. This subsequently gives VSSCs a wide-ranging system of cameras with to record data.

Representatives were asked about the frequency of camera maintenance, in conjunction with questioning about maintenance employees from earlier in the survey. Responses indicate that camera maintenance is provided on an as needed basis at three centers (the TriMet Center, Valley Metro DCC, and the Ogden ATAC). San Diego MTS reported that they maintain cameras daily, and SEPTA maintains their vehicle cameras and DVR systems every six months, while other cameras are maintained as needed. Regarding camera replacement, responses indicate that camera replacement ranges between the centers, and in many cases, centers largely replace cameras as needed. TriMet has plans for replacement every five years and SEPTA uses the set shelf life of the camera, although many cameras are already over 12 years old. San Diego MTS replaces cameras every three to five years or as-needed, with Valley Metro also replacing on an as-needed basis. A

separate IT maintenance group handles Ogden City Police camera replacement, so the frequency of camera replacement was unknown by the ATAC representative. Several agencies noted that budgetary issues often conflict with maintenance and the ability to replace cameras according to schedule. As result, many cameras are still in use at some VSSCs that are older than originally planned. Budget issues may also cause issues with future plans for new equipment.

VSSC representatives were asked several questions regarding what data is recorded by the camera system they manage and how that data is ultimately used. It was found that cameras are used primarily to record visual data, and all agencies use cameras for recording and/or monitoring. The San Diego MTS, TriMet, and Valley Metro VSSCs indicate that they have some cameras with visual and audio capabilities; however, TriMet cameras only record visual data on platforms and trains (while buses capture audio). The Ogden Police ATAC has some newer-model cameras that may have advanced capabilities such as audio and heatmapping, though these capabilities have not been fully explored or implemented yet. SEPTA currently collects only visual data due to litigation potential, but has plans to incorporate audio data in the future.

Audio/Visual technology exists that utilizes advanced tracking and identification capabilities to pinpoint individuals of interests or identify vehicles by license plate, among other examples. Despite these advances in technology, most VSSC researched in this study do not utilize analytics software for the identification and tracking of individuals. Several center representatives replied to this question by noting that Facial ID software presents numerous legal and civil concerns; as a result, it is not allowed in many jurisdictions. However, SEPTA reported that the local police department may have software with these capabilities and have a license plate identification system, which has been tested but is not currently used. The San Diego MTS center indicated they utilize analytics for trespassing and alerts. While apparently not common yet due to some concerns, it appears that advanced analytics technology is being implemented in some situations at VSSC, depending on local law and regulations from the transit agency a VSSC serves.

Regarding the data that is collected by the VSSC from cameras, responses indicate that visual data ultimately provides key evidence in law enforcement, criminal, and internal investigations. Numerous uses were listed by VSSC representatives for video data, with responses from each VSSC representative listed in the table below:

Table 7. VSSC Video Surveillance Data Uses

VSSC	Video Surveillance Data Uses
San Diego MTS OCC	Law enforcement investigations, claims, risk, training, and internal investigations
TriMet Public Safety Ops. Center	Used for operational purposes and risk management, and criminal investigation
Valley Metro DCC	Review of Safety and Security incidents
SEPTA Video and Evidence Unit	Litigation and claims, criminal investigation, special event coverage, training, preventative safety measures
Ogden City Police ATAC	Public safety, crime prevention, criminal case investigation

As seen from the table, common video data uses include investigation, crime prevention, training, litigation and claims, and other uses. Some VSSC such as SEPTA note that they also use this data to provide special event coverage and review of incidents at special events. Perhaps the most common video data use at the VSSC in this study involves review of archived footage for investigative purposes. Representatives from all VSSC listed this as a common data use, noting that review of incidents occurred at least weekly, if not daily.

As noted previously in this report, review of footage for investigation is more common than live monitoring of areas using cameras. However, live monitoring does occur at VSSCs to some degree. The TriMet and San Diego MTS Centers reported that they ID individual cameras for live viewing regularly, with the assumption that live viewing is used primarily for security purposes and crime prevention. SEPTA reported that the local police department may utilize the system for ID individual cameras and monitoring, while the Video and Evidence Unit will perform some live monitoring during major public events. As for how long individual cameras are live viewed, the San Diego MTS and SEPTA centers indicate that time of live viewing is situationally dependent. The TriMet center essentially ID’s cameras for live viewing as time allows. The Valley Metro and Ogden City center’s do not typically utilize live viewing of cameras.

The process of recording and logging incidents is important to the functions typically found in these centers. Each VSSCs protocol for logging incidents that are caught on camera was found to use either a platform, application, or database to track requests, documentation, videos, and other captured data. The San Diego MTS VSSC logs most incidents in a CAD or with other reports. The TriMet center has an in-depth logging process of video requests from law enforcement, and such requests are stored in a database (organized by type such as complaint investigation, risk management, etc.). Any needs identified on videos are document by TriMet employees as well. The SEPTA, Valley Metro, and Ogden City Police centers use an incident management system for reports, in which videos can be bookmarked for future reference. These bookmarks are then used for review and investigation. As law enforcement and other agencies may frequently utilize cameras for viewing and video stored by a VSSC, it was asked if other agencies may have access to the camera system by a VSSC. The SEPTA, Valley Metro, and San Diego MTS centers indicate that they provide direct access to their camera system to other agencies. These other organizations are mainly part of the local law enforcement and can utilize the system for the same purposes as the VSSC (incident review and management, live viewing, etc.). The TriMet and Ogden City Police centers do not provide direct access to their surveillance system, but work with other law enforcement agencies to provide data when needed. Parties that respond to reported incidents as listed by VSSC centers, are from most to least common, rail supervisors, local dispatch, transit police and private security depending on the incident.

Table 8. Reporting and Organizational Access Responses

VSSC	Incident Reporting	Response to incidents	Additional Organizational Access	Additional Organizational Uses
San Diego MTS OCC	Logged in CAD or other reports	Transit Police, Rail Supervisors, Local Law Enforcement/First Responders	Local Law Enforcement (live-video streaming)	Live monitoring of video

TriMet Public Safety Ops. Center	Logged in a database. Documented when needs identified on video	Rail Supervisors, Private Security, Law Enforcement	None	N/A
Valley Metro DCC	Logged using incident management software application	Rail supervisors, Private security, Law Enforcement	Local Law Enforcement	Not Listed
SEPTA Video and Evidence Unit	Incidents identified on camera. Video is saved, marked, and stored	Transit Police, Rail Supervisors, Local Dispatch	Local Law Enforcement, System Control	Incident review and management. Police monitor live video
Ogden City Police ATAC	Data is exported, attached to case file, bookmarked, and stored	Local dispatch, Ogden City Police.	None	N/A

Table 9. Camera Maintenance and Placement Responses

VSSC	Camera Maintenance	Camera Replacement	Camera location Determination
San Diego MTS OCC	Daily	Every 3-5 years and/or as needed	Determined by Security Systems Admin/MTS mgmt..
TriMet Public Safety Ops. Center	As needed	Every 5 years (Dependent on funding)	Holistic approach. Different departments are consulted. List of characteristics used (sight distance, potential obstacles, etc.). Site specific trend/characteristics considered
Valley Metro DCC	As needed	As needed	Standard design criteria for platforms, park & rides and light rail vehicles. Maximization of field of view.
SEPTA Video and Evidence Unit	As needed. Routine maintenance at stations. Vehicles/DVR's every 6 months	Dependent on funding. Some cameras are 12+ years old	Determined by Police and C&S
Ogden City Police ATAC	Unknown (handled by IT)	Unknown (handled by IT)	Partnership with Ogden City on placement. Matching of public safety with infrastructure protection

Regarding the storage of data itself, data collected from cameras is stored on a server by San Diego and Valley Metro, while TriMet and SEPTA store video data on a hybrid of a server and multiple other storage locations. The Ogden Police ATAC representative was unsure of the exact storage site for video data at the time of the survey. These camera and data servers are located onsite for SEPTA and San Diego while the TriMet server is at an offsite location, while Valley Metro and Ogden City Police indicated they were unsure of the server

location. Video Unit employees at San Diego MTS and SEPTA with direct access to the camera system can also access stored data. SEPTA employees can distribute copies of videos when requested by other transit or law enforcement groups. Ogden City Police allows all crime analysts access to the stored data. Both TriMet and Valley Metro limit the number of employees with stored data access to crime prevention and data analysis coordinators or managers in Security, Safety and Operations. TriMet also allows limited access to their risk management group and IT Maintenance Personal for support purposes.

Table 10. Data Types and Storage Responses

VSSC	Audio/Visual Data	Storage Platform	Storage location	Access to video
San Diego MTS OCC	Audio and Visual	Server	Onsite	Center Employees
TriMet Public Safety Ops. Center	Audio and Visual (dependent on location)	Hybrid/Multiple	Offsite	Center Director, Risk Management (limited), IT Personnel (for support)
Valley Metro DCC	Audio and Visual	Server	Unknown	Managers in Security, Safety, and Operations
SEPTA Video and Evidence Unit	Visual (Audio in Future)	Hybrid/Multiple	Onsite	Center Employees (can distribute video when requested)
Ogden City Police ATAC	Visual	Unknown	Unknown	Center Employees

Center representatives were questioned on any future plans and considerations currently in place or in development at their respective VSSCs. Responses show that all the centers in this study have plans to revise or expand their current surveillance systems. These plans include the placement cameras and other equipment in new locations, while upgrading or replacing existing cameras with newer technology. Some more specific plans were discussed as well. The TriMet center plans on retrofitting train cameras and adding these devices to their milestone system. The center also wants to begin furthering their work in crime prevention with law enforcement and upgrade their software to include advanced analytics technology (such as license plate identification). The Valley Metro OCC/DCC plans to install cameras with intrusion detection software capabilities. The Ogden City Police ATAC plans on installing semi-permanent cameras which can be used as needed, then removed and re-installed in a new location. These cameras would aid in monitoring various situations such as public parks and homelessness. These plans also show how advanced detection technology and analytics will likely become more commonplace in the operation of VSSCs moving forward.

Table 11. Live Viewing, Software, and Future Development Responses

VSSC	ID'd Cameras	Live Viewing Duration	Software Types	Analytics Software	Future Plans
San Diego MTS OCC	Yes	Dependent on situation	Avigilon	Analytics for trespassing/alerts	Adding new cameras and updating existing cameras
TriMet Public Safety Ops. Center	Yes	As time allows	Milestone (Xprotect)	Video Analytics Software. Facial ID not allowed	General camera upgrades and replacement. New locations for cameras. Increased analytics
Valley Metro DCC	No	N/A	UNK	None	New digital cameras with intrusion detection software
SEPTA Video and Evidence Unit	For special events	During special events	DTI, Gatekeeper, Genetec	Local Police have some analytics. Tag system in place but not in use	Constant upgrading and installing of new equipment
Ogden City Police ATAC	No	N/A	Avigilon, Verkada	Verkada cameras – heatmapping/tracking. License plate readers. Object detection	Semi-permanent camera installations

5 CONCLUSIONS

As can be seen from the previous section, many different characteristics present at VSSCs were discussed and recorded during this study. Overall, it was found that VSSCs generally share similarities that are common in their operations and functions. Some of these general characteristics are listed below:

- VSSCs typically operate in close conjunction with security or safety departments within their parent agency. They can quickly communicate security issues to other departments to direct response.
- They utilize a centralized location typically in close proximity to related departments (i.e. security or operations).
- VSSCs will employ a supervisor or director who oversees other employees managing different tasks within the center.
- VSSCs primary functions include emergency management and response, criminal investigation, provision of security, and video surveillance (whether live viewed or used for review purposes).
- VSSCs will use cameras on numerous platforms (vehicles, facilities, etc.) for surveillance purposes.
- VSSCs operate using a variety of camera types and equipment, but new technologies with advanced capabilities are becoming more commonplace.

Along with these and other general trends, VSSCs have numerous differences in how they operate based on the needs of the particular transit agency they serve. Variations may be seen in number of cameras utilized by a VSSC, specific camera uses, software types, how maintenance of the system is handled (though maintenance often originates from departments outside the VSSC), and numerous other factors. Budget required for a VSSC depends on the size and scale of the operation for a transit agency. It is likely that a \$1,000,000 - \$1,500,000 annual budget with approximately \$2,000,000 in salaries may be expected for a mid-size transit agency, similar numbers to the TriMet and SEPTA VSSC's explored in this study. However, this is an estimate and the amount required could be less or more depending on what is required and how budget is managed. It is possible that a transit agency looking to construct a VSSC has numerous aspects of infrastructure in place that a VSSC can utilize, such as a working camera system, maintenance crews, chain of command for security response, employees with video monitoring experience, and software to manage these systems. A new VSSC could be engrained into existing infrastructure at an agency; this may reduce the budget that is necessary to construct and operate a center.

When examining responses to surveys and the overall study results, it can also be seen that VSSCs have a number of characteristics specific to their own operations. Some VSSCs have backup locations which can be used when needed. Others utilize remote function in lieu of a physical location when needed. Actual operations will vary based on what roles the VSSC is directed on by its governing agency; many VSSCs utilize their video for investigative purposes and review of incidents, while others will use live monitoring to identify and report security hazards. VSSCs may also have duties that cross over into transit operations and direction while others remain solely in use for security purposes. Equipment types and the scale of operations at VSSCs may vary based on the area and systems monitored; SEPTA monitors over 32,000 cameras across the Philadelphia metro area while the Ogden ATAC manages 600 in Ogden City. Camera equipment varies depending on budget availability, but many centers have begun to replace older fixed cameras with advanced PTZ cameras and other types, with some forays into advanced detection technology and analytics. Overall, differences in VSSC's reflect the different requirements they face based on their location and characteristics of the area they monitor.

Ultimately, VSSCs are common across transit agencies in the United States, as well as law enforcement agencies. VSSCs can centralize and coordinate security efforts across a transit system, running security cameras, investigating previous incidents, monitoring events, and reporting incidents to law enforcement (in addition to other tasks). How these tasks are carried out depends heavily on the specific VSSC. Some operate with a team of employees, others consist of a director or manager delegating and managing tasks among employees who work partly in the VSSC and partly in other departments. There also may be other departments or agencies which have access to the VSSC system, in order to perform their own functions with the VSSC equipment. VSSCs often work in partnership with law enforcement to carry out their duties and utilize a host of camera equipment and managing software to record and store video. Future developments include the implementation of analytics software and expansion of camera systems. These characteristics illustrate how a VSSC has numerous options in how it may function and carry out its role to centralize and manage security monitoring and administration within a transit agency

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7 APPENDIX 1: RECOMMENDATIONS FROM BEN MCCLEAN: PORTLAND TRIMET

Ben McClean is the Crime Prevention and Data Analysis Coordinator at the TriMet Public Safety Operations Center. Mr. McClean was the primary contact and interviewee for this VSSC. After the interview with Mr. McClean was complete, he gave the research team a number of personal recommendations for a new VSSC based on his experience as a VSSC director, as well as other documents. The following text is taken directly from the recommendation document that Mr. McClean sent to Avenue Consultants and is unaltered. These have been attached as it was felt by the research team that his direct recommendations would provide value to the process of developing a VSSC.

Ben McClean VSSC Recommendations:

Entities and organizations that will benefit from the VSSC:

- All internal divisions that rely on cameras and video recordings (Risk Management, Operations, Legal Services, Law Enforcement).
- To some extent, the public, assuming the VSSC will participate in incidents involving public safety.

Potential locations for the VSSC:

- Depends on the purpose of the VSSC. If it's centric around public safety/law enforcement, then it makes most sense to be in a law enforcement facility.
- If the purpose is centric around transportation and operations, then it doesn't need to be in an LE facility but should have effective established methods of communication with other internal entities for when incident management overlaps with other divisions.
- Other physical locations may still have access to cameras; however, their focus should be to utilize those cameras for a different purpose than the VSSC.

Staffing needs for the center (required and supplemental; qualifications; full-time vs. part-time):

- Best to have VSSC-specific job classifications
- Hours of operation should take into consideration other factors:
 - If buses/trains operate 24/7, then it's possible the VSSC should be staffed the same hours.
 - If the VSSC is centric around law enforcement and public safety, then another option is to have VSSC staffed during the same hours Transit Police are operating.
 - Additional staffing for special events or missions
 - Someone should have 24/7 access to cameras, whether in the VSSC or elsewhere, for critical incidents.
 - If not 24/7, there should be an after-hours contact for critical incidents.
- No opinion on full-time versus part-time, but I'd lean toward dedicated full-time employees only.
- The VSSC greatly benefits from having personnel with experience in investigations, law enforcement, or other public safety classifications. Depending on the scope of the VSSC, general security experience may

not suffice, especially if VSSC personnel is also responsible for the preservation of video evidence as it relates to criminal investigations.

Coordination considerations (e.g., number of employees that should be watching cameras; duration of viewing; hours of operation; critical times to monitor cameras, etc.):

- VSSC should be equipped to monitor and transmit radio traffic from both internal and external radio frequencies. It is highly effective to act as the 'in between' between the transportation agency and law enforcement, as incidents regularly overlap. Police incidents that are non-UTA may reasonably be captured by UTA cameras, so having VSSC personnel monitor police radio traffic in real-time can benefit both the UTA and law enforcement.
- Alternatively, law enforcement may receive a UTA-related call for service that hasn't been reported to the UTA. VSSC personnel can then communicate that information to the UTA.
- Best to have at least 1-2 people monitoring cameras and radio at all times of operation.
- Depending on the capabilities of the VSSC, there needs to be communication with the 911 communications center and local law enforcement agencies. This will inform the agencies on how the VSSC may be able to assist, radio call signs, limitations, etc.
- Another option is to have the VSSC composed of multiple entities (security, police, operations, etc.). This complicates operations but adds depth to the level of experience. This may also be easier to staff rather than VSSC-specific job classifications.

Access and security considerations (who should be allowed in the center; how is access restricted; how is access monitored over time?):

- Also depends on the scope of the VSSC and what type of information will be available/stored.
- At a minimum, the VSSC should be secured with a locking door, preferably with limited card access.
- Additional considerations are signage indicating 'Authorized Personnel Only', cameras showing the entrance to the VSSC, etc.
- If there are law enforcement functions within the VSSC, it's likely that everyone who enters the facility will need to have CJIS clearance.

Required components and equipment:

- High-end computer equipment that can handle monitoring multiple cameras at once
- Multiple computer monitors to track different components (processing, cameras, access control, etc.)
- High-speed, hard-wired network connections
- Strong cellular signal from everywhere inside the VSSC
- Strong radio reception everywhere inside the VSSC, including receiving and transmitting radio traffic
- Landline phones with a universal VSSC extension
- Power to the room should be robust enough to support all computer equipment and prevent shorts.

- Ability to access, at a minimum, UTA radio recordings (if the VSSC is responsible for investigative functions).
- Optional:
 - Large displays (~100" Planar screens) for critical incident management, training, etc.). Depends on how the seating arrangement is laid out in the VSSC.
 - Ability to access police resources (e.g., CAD, LEDS, RegJIN, etc.). Depending on the organizational structure of the UTA, this may require network connections from more than one entity.
 - Radio docking stations. Handheld radios work well too.
 - Multiple radios depending on how many radio channels should be monitored.
 - Dedicated CAD screens
 - Joysticks for PTZ controls
 - Scanner for case file documentation

How will the systems be monitored and how will operations be quality controlled?

- Should have a dedicated VSSC manager.
- Depending on the scope and amount of staffing, possibly a shift supervisor.

Information on budgeting

It's difficult to quantify how much money we spend annually for video operations if we're including salaries (many employees that support video operations have other primary or auxiliary duties).

Video equipment: ~\$1,000,000 - \$1,500,000 annually (this includes platform, bus, and rail cameras and other necessary equipment such as storage drives/video recorders/network switches/fiber/etc.)

Personnel: ~\$2,000,000 - \$2,500,000 annually (this includes video operators for criminal investigations, back-end IT staff, and camera repair technicians for platform, bus, and rail)

Again, these are very rough estimates as the numbers don't include Risk Management or other supervisors that also review video as part of their responsibilities.

8 APPENDIX 2: JOB DESCRIPTIONS

VSSC representatives from the TriMet Public Safety Operations Center and Ogden Area Tactical Analysis Center provided job descriptions used when hiring new positions as a resource to this study. These job descriptions contain details on the requirements of new hires for VSSC's, and what may be expected of employees while working at a VSSC. TriMet's descriptions are intended for future positions that have not currently been hired.

TriMet Public Safety Operation Coordinator Job Description

Coordinator, Public Safety Operations

JOB DESCRIPTION:

Participate in investigative and operational functions within TriMet's Public Safety Operations Center (PSOC) and Operations Command Center (OCC). This includes the real-time support for in progress calls for service and preservation of video evidence for security and law enforcement related incidents.

ESSENTIAL FUNCTIONS:

1. Coordinate retrieval, investigation, and preservation of video evidence for security and law enforcement related incidents.
2. Participate in live CCTV surveillance operations and conduct investigative follow-up as needed.
3. Monitor radio traffic from multiple sources and Computer-Aided Dispatch (CAD) to assist with operational support.
4. Document incidents and investigative findings.
5. Work cohesively with the Transit Police Division, District Attorney, and other law enforcement partners.
6. Coordinate retrieval for requests for video from internal TriMet divisions.
7. Assist with developing strategies to assess and mitigate security risks.
8. Participate in advising and planning for security-related components of future projects.
9. Research and implement innovative solutions.
10. Conduct site visits to understand, address, and mitigate location specific concerns.
11. Provide testimony for court proceedings.
12. Perform technical troubleshooting as needed.
13. Provide in-person support and situational guidance within the OCC on a rotational basis.
14. As needed, may be required to work outside of scheduled hours.
15. Perform other duties as assigned.

PREREQUISITES:

A minimum of five (5) years total credited experience in an investigative, loss prevention, corrections, public safety and/or law enforcement environment.

College level course work or training in safety, criminal justice, security, or related field is desired.

Or any other equivalent combination of training or experience.

KNOWLEDGE, SKILLS & ABILITIES:

1. Knowledge of regional law enforcement, public safety, security, crime prevention principles and practices, and the criminal justice system.
2. Proficiency and experience with investigative techniques and procedures related to digital evidence
3. Proficiency in CCTV hardware and software.
4. Excellent judgment and ability to analyze situations accurately and adopt an effective course of action.
5. Exceptional organizational skills and attention to detail to programmatic needs, including but not limited to, report writing and analyzing data.
6. Ability to work confidentially and with discretion.
7. Ability to work and problem solve independently and with minimal supervision managing projects with competing expectations and deadlines.
8. Ability to clearly and effectively communicate orally and in writing, including detailed documentation.
9. Ability to establish effective working relationships, professional rapport, and effectively accomplish work that includes a wide array of individuals, groups, policies, and processes.
10. Exhibit high integrity and ethical standards.



TriMet Public Safety Investigations Manager

Manager, Public Safety Investigations

JOB DESCRIPTION:

Manage the development, implementation, and sustainability of TriMet programs, procedures, and investigations related to security operations. Perform physical facility security inspections. Ensure a commitment to safety through consistent and professional behaviors in performance of job requirements that demonstrate safety is a fundamental value that guides all aspects of our work. Performs related duties as required.

ESSENTIAL FUNCTIONS:

1. Oversee functions of the Security Operations Center.
2. Develop and manage programs and employees for CCTV, Access Control, Security Data Analytics, and critical intelligence to support the needs of TriMet and outside agency stakeholders.
3. Develop, manage, and coordinate investigative functions for security and law enforcement incidents.
4. Conduct surveillance and/or digital investigative forensics.
5. Work cohesively with investigators from various law enforcement agencies for criminal investigations that affect transit operations, employees, riders, and other stakeholders. May conduct field work as necessary.
6. Coordinate directly with TriMet Transit Police, District Attorney and other law enforcement partners.
7. Provide evidence to law enforcement and the District Attorney for arrest and/or prosecution.
8. Assist with monitoring and providing real-time support for in-progress security and law enforcement incidents affecting the transit system.
9. Lead research into new technologies to support the Division.
10. Utilize cost-effective measures to upgrade and expand existing infrastructure to enhance operational and investigative abilities.
11. Assist with developing strategies to assess and mitigate security risks and maintain continuity of operations during periods of disruption due to natural and human-made disasters to safeguard TriMet's operations and ensure safe and timely restoration of services.
12. Participate in advising TriMet Divisions on security-related components of future projects.
13. May serve as Program Manager for security-related grants.
14. Liaison with cybersecurity stakeholders.
15. Conduct site visits to understand, address, and mitigate location specific concerns.
16. Continually evaluate the effectiveness of security plans, programs, and procedures.
17. Researches, coordinates, and implements changes to Crime Prevention Through Environmental Design (CPTED) strategies throughout the system.
18. Supervise assigned staff.

PREREQUISITES:

A minimum of eight (8) years total credited experience in a security management, criminal investigations, crime analysis, public safety and/or law enforcement environment. A minimum of three (3) years' experience involving program management responsibilities.

College level course work or training in safety, criminal justice, security, business, public administration, or related field is desired.

Or any other equivalent combination of training or experience.

KNOWLEDGE, SKILLS, AND ABILITIES:

1. Knowledge of security, law enforcement, and crime prevention principles and practices.
2. Experience in investigative case management.
3. Moderate level of technical expertise, to include but not limited to, Microsoft Office Suite, CCTV software and hardware, access control software and hardware, and ability to become familiar with proprietary software applications.
4. Understanding of the criminal justice system and demonstrated proficiency in investigative techniques and procedures.
5. Ability to empower staff and teams to achieve department and individual goals; provide clear direction and expectations.
6. Ability to work independently and with minimal supervisions managing projects with competing expectations and deadlines.
7. Demonstrated ability to use good judgment and independently manage priorities for multiple projects with diverse timelines and potentially conflicting deadlines.
8. Exceptional organizational skills and attention to detail to programmatic needs, including but not limited to, report writing and analyzing data.
9. Ability to effectively resolve problems independently.
10. High integrity, ethical standards, and sound judgment.
11. Proficiency in written and oral communications.
12. Proficiency in access control systems and best practices.
13. Ability to work confidentially and with discretion.
14. Excellent judgment and ability to analyze situations accurately and adopt an effective course of action.
15. Ability to establish effective working relationships, professional rapport, and effectively accomplish work that includes a wide array of individuals, groups, policies, and processes.

REPORT TO:

Director, Security and Emergency Management

DIVISION:

Safety & Security

Ogden ATAC Crime Analyst Job Description



Police Department

CRIME ANALYST

Dept.: Police Department	Division:
Type Position: Regular Full-time	FLSA Classification: Non-Exempt
Employment Category: Merit	Revision Date: March 24, 2017

Class specifications are intended to present a descriptive list of the range of duties performed by employees in the class. Specifications are not intended to reflect all duties performed within the job.

POSITION SUMMARY

Law Enforcement Analysts provide intelligence and analytical support to law enforcement. Analysts provide law enforcement management/decision-makers and front-line officers with information they need to better accomplish their duties. Analysts work as part of a team in a collaborative environment. The analysts work under the supervision of police administration, specifically at OPD, under the Commander of Support Services.

EXPERIENCE AND TRAINING STANDARDS

Current or former law enforcement experience, helpful but not required. A Bachelor’s degree from an accredited college or university or equivalent training and experience. Analyst Certification is preferred, but not required. Valid Utah driver’s license. No felony convictions.

NIMS REQUIRED TRAINING

Employee will be required to complete NIMS IS100, IS200, IS700, IS800 and IS704 within six months of hire.

Failure to obtain/maintain license and certificate as outlined above will result in termination from the position.

ESSENTIAL JOB FUNCTIONS

- Ensure that the objectives and responsibilities of the Crime Analysis Unit are met.
- Collect, research, assemble, and analyze information and data, and produce and disseminate informational and intelligence reports for the Ogden City Police Department and other agencies as appropriate.
- Coordinate the development of flow charts, graphs, and other crime analysis charts to assist in developing suspect and crime trend identification.
- Work closely with command staff of the Ogden City Police Department and other agencies as assigned by the Ogden City Police Chief or division commander.
- Ensure that the rules and regulations of 28CFR are observed and adhered to in regards to the collection, dissemination and storage of intelligence; in addition, oversee records maintenance of all Unit/Division requests and information disseminated, ensuring compliance with the Government Records Access Management Act (G.R.A.M.A.).

- Conduct predictive analysis to aid in department personnel deployment.
- Represent the Unit in all appropriate law enforcement meetings.
- Ensure that the Unit maintains its equipment and programs in good working order, and that current and projected asset needs are addressed in a timely manner.
- Oversee, produce, and disseminate timely intelligence bulletins, maps, statistical reports and other appropriate information.
- Be involved in the training effort for the case management system, crime analysis output and “train the trainer” for each agency in the Weber and Morgan County area.
- Work closely with, and have a working understanding of GIS databases, and specific understanding and knowledge of ESRI GIS products, and Microsoft Office Suite products.
- Participate in safety and risk management activities; take action to reduce liability to the city.
- Employee is required to work as part of a team, frequently meeting with co-workers and supervisors; employee is required to communicate in-person with the public during office hours; employee is required to use on-site equipment. Attendance and punctuality are essential functions of this position.
- Perform other duties as assigned.

QUALIFICATIONS

Knowledge, skills, abilities:

- General understanding of state and federal laws.
- Thorough understanding of the process of crime analysis, behavioral and geographic profiling.
- General understanding of investigative procedures and general law enforcement practices.
- Knowledge and experience in using analytical procedures for conducting analysis.
- Proven capabilities in research and analysis.
- Proficient in the use of the Spillman RMS, and/or other Records Management Systems.
- Fully Proficient in the use of Microsoft Office Suite Programs; especially Excel, Word, Access, PowerPoint and Visio. Familiarity with Microsoft Windows operating systems.
- Training and Experience with electronics forensics analysis tools a significant plus (e.g. – cellphone analysis – Cellebrite, GeoCell, Penlink, etc; video analysis – Pinnacle, Adobe Premier, Final Cut Pro, etc.).
- Training and experience in predictive analysis.
- Proficiency in statistical analysis.
- Proven capability and competence in writing and editing.
- Ability to clearly and succinctly report results of analysis.
- Competence, confidence, and comfort in presenting and verbally briefing analytical results to management and others as appropriate.
- Understanding of RISS, e-Trace and ViCap programs and resources helpful.
- Thorough understanding of relational databases and file organization.
- Proven research methods and techniques; good public relations skills.
- Proper English usage, spelling, grammar and punctuation.

- Extensive familiarity with modern office procedures, methods and computer equipment.
- Understanding of socio-economic, cultural, psychological, biological, environmental, and historical theories/influences on criminal behavior; victimology.
- Have the ability to understand and compare local and national crime statistics (e.g. Uniform Crime Report [UCR] and National Incident Based Reporting System [NIBRS] data*) using common data standards, codebooks, and data dictionaries; understand the rules and standards, as well as the caveats and shortcomings, of these data sets.
- Know the basic principles of geographic analysis, and how to create maps by using appropriate data sets.
- Know how to produce point symbol (pin) maps, buffer maps, hot spot and density maps; be able to analyze maps to determine the nature of crime problems related to location, to use maps in forecasting and predicting future incidents of crime trends and series, and to interpret maps for specific audiences.
- Have knowledge of issues integral to crime mapping (e.g. geocoding, privacy, and data quality).
- Create visual work products, such as link analysis and visual investigative analysis charts, which depict information that can further investigations and intelligence efforts.
- The ability to develop an effective, directed and informative verbal presentation that will be useful to the specific audience being addressed; the knowledge of visual aide software and operation; the ability to handle audience participation and time constraints, and to answer questions concisely and accurately.
- Establish and maintain effective working relationships with those contacted in the course of work.
- Maintain mental capacity which allows for effective interaction and communication with others.
- Ability to comply with all city policies and regulations; including safety and risk management standards.

WORKING CONDITIONS

The work conditions described here are representative of those an employee may encounter while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

PHYSICAL REQUIREMENTS

Work is performed in an office environment. Sustained posture in seated position and prolonged periods of typing. Employee is frequently required to sit, walk and talk or hear. Employee is occasionally required to lift and or move up to 20 lbs.

Physical Demands				
Physical Activities				
<i>How much on the job time is spent on the following physical activities. Show the time by checking the appropriate boxes</i>	None	Under 1/3	1/3 to 2/3	Over 2/3

Standing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Walking	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sitting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Use hands & fingers to handle or feel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Reach with hands and arms	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Climb or balance	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stoop, kneel, crouch, or crawl	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Talk or hear	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Taste or smell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Lifting				
<i>Does this job require that weights be lifted or force be exerted? If so, how much and how often?</i>	None	Under 1/3	1/3 to 2/3	Over 2/3
Up to 10 pounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Up to 25 pounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Up to 50 pounds	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Up to 100 pounds	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
More than 100 pounds	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Vision
<i>Does this job have any special vision requirements? Check all that apply.</i>
<input checked="" type="checkbox"/> Close vision (clear vision at 20 inches or less)
<input checked="" type="checkbox"/> Distance vision (clear vision at 20 feet or more)
<input checked="" type="checkbox"/> Color vision (ability to identify and distinguish colors)
<input checked="" type="checkbox"/> Peripheral vision (ability to observe an area that can be seen up and down or the left and right while eyes are fixed on a given point.)
<input checked="" type="checkbox"/> Depth perception (three-dimensional vision, ability to judge distances and spatial relationships)
<input checked="" type="checkbox"/> Ability to adjust focus (ability to adjust the eye to bring an object into sharp focus)
<input type="checkbox"/> No special vision requirements

Make note of specific job duties that require the physical demands selected above:

Work Environment				

Work Environment				
How much exposure to the following environmental conditions does this job require?	None	Under 1/3	1/3 to 2/3	Over 2/3
Wet or humid conditions (non-weather related)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work near moving mechanical parts	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work in high, precarious places	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
Fumes or airborne particles	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toxic or caustic chemicals	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outdoor weather conditions	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
Extreme cold (non-weather)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Extreme heat (non-weather)	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk of electrical shock	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
Work with explosives	X	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Risk of radiation	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
Vibration	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>

Noise
How much noise is typical for the work environment of this job? Check the appropriate level below.
<input type="checkbox"/> Very quiet conditions (examples: forest trail, isolation booth for hearing test)
<input type="checkbox"/> Quiet conditions (examples: library, private office)
<input checked="" type="checkbox"/> Moderate noise (examples: business office with computers and printers, light traffic)
<input type="checkbox"/> Loud noise (examples: metal can manufacturing department, large earth-moving equipment)
<input type="checkbox"/> Very Loud noise (Examples: jack hammer work, front row at a rock concert)

Make note of specific job duties affected by the environmental conditions selected above:

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