



ADDISON POLICE DEPARTMENT

License Plate Recognition System and Optical Cameras

Pilot Project Report

APRIL 2019 - APRIL 2020

Police Chief Paul Spencer

Presented to Addison City Council on May 26, 2020

License Plate Recognition and New Technology

2019 Pilot Project

Based on Council's direction to explore additional technologies for Addison's public safety efforts, the Addison Police Department identified two key programs: License Plate Recognition and Optical Cameras. The Town then selected Vigilant Solutions as a vendor for a suite of comprehensive software including License Plate Recognition (LPR), Facial Recognition (FR), neighborhood system alerts, and commercial data alerts. The goal of Council and the Addison Police Department is to use this software to increase community safety and the protection of property.

Due to the unique location and composition of our Town the Addison Police Department receives approximately 75% of its calls for service from the business community. On a busy day or night our officers may not be able to spend the amount of time within our residential areas that many of our citizens expect, leading to a perceived lack of safety in our neighborhoods. An LPR system was selected to help address this issue by acting as a force multiplier for our residential areas. Alerts are sent to patrol officers when a criminal enters the neighborhood and the daily scans of vehicles provide valuable forensic evidence to investigators should a crime occur. This program helps accomplish our mutual goal of keeping Addison safe by helping to accurately guide police patrols and contacts.

The Town of Addison installed LPR equipment in eight locations in the Midway Meadows/Les Lacs and Oaks North/Winnwood neighborhoods. The equipment is located at each neighborhood street entrance and scans vehicle traffic in both directions. The eight pieces of equipment scanned a total of 3,329,871 license plates in one year. All stored data is purged every 45 days in accordance with Town policy. Additionally seven optical cameras were installed along the Linear, Redding, and White Rock Creek Trails to have video footage available in case an incident is reported.

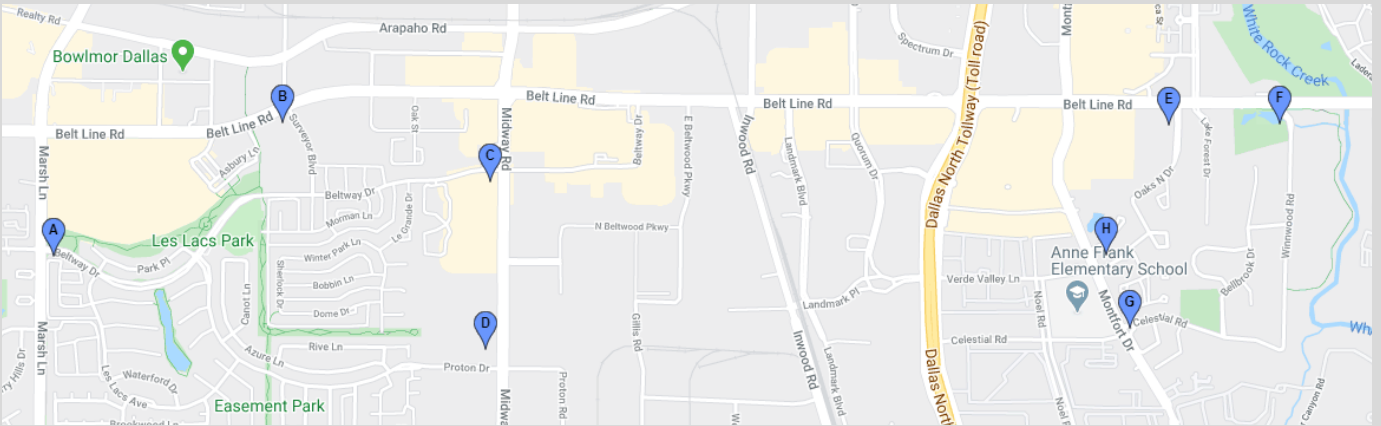
Explanation of Technology

The License Plate Recognition program includes both computer software and physical scanning equipment. Special equipment mounted on poles scans license plates by looking for combinations of letters and numbers on a reflective surface. When the computer believes it has recognized a possible license plate it triggers a "scan" of the rear bumper. These scans are securely stored on our LPR software per Council's guiding principles and are only accessible by police personnel undertaking legitimate law enforcement purposes.

The LPR system does not capture video nor can it be viewed on any sort of live or recorded feed. The scans provide only basic vehicle information: license plate, VIN, make, and model. No personal identifying information about the owner is obtained or stored. If Detectives reference LPR scans they must use entirely separate software in their investigations to learn anything about the possible owner or driver of the vehicle.

LPR equipment installed in our neighborhoods is also capable of pushing out critical alerts about suspect vehicles when they are scanned. Officers receive these alerts on their in-car computers and respond to the scene looking for the vehicle. After major crimes patrol supervisors use the more robust desktop version to search for similar vehicles in the area, tag newly stolen vehicles, and focus their suspect location efforts. When a relevant case is assigned to an investigator they sort through stored data to identify the involved vehicle leading to suspect apprehension.

LPR Equipment Locations



Les Lacs & Midway Meadows:

- Marsh & Beltway
- Surveyor & Beltway
- Midway & Beltway
- Midway & Proton

Oaks North & Winnwood:

- Montfort & Celestial
- Montfort & Paladium
- Oaks North & Belt Line
- Winnwood & Belt Line

Installed Equipment Examples



Optical Cameras

Explanation of Technology

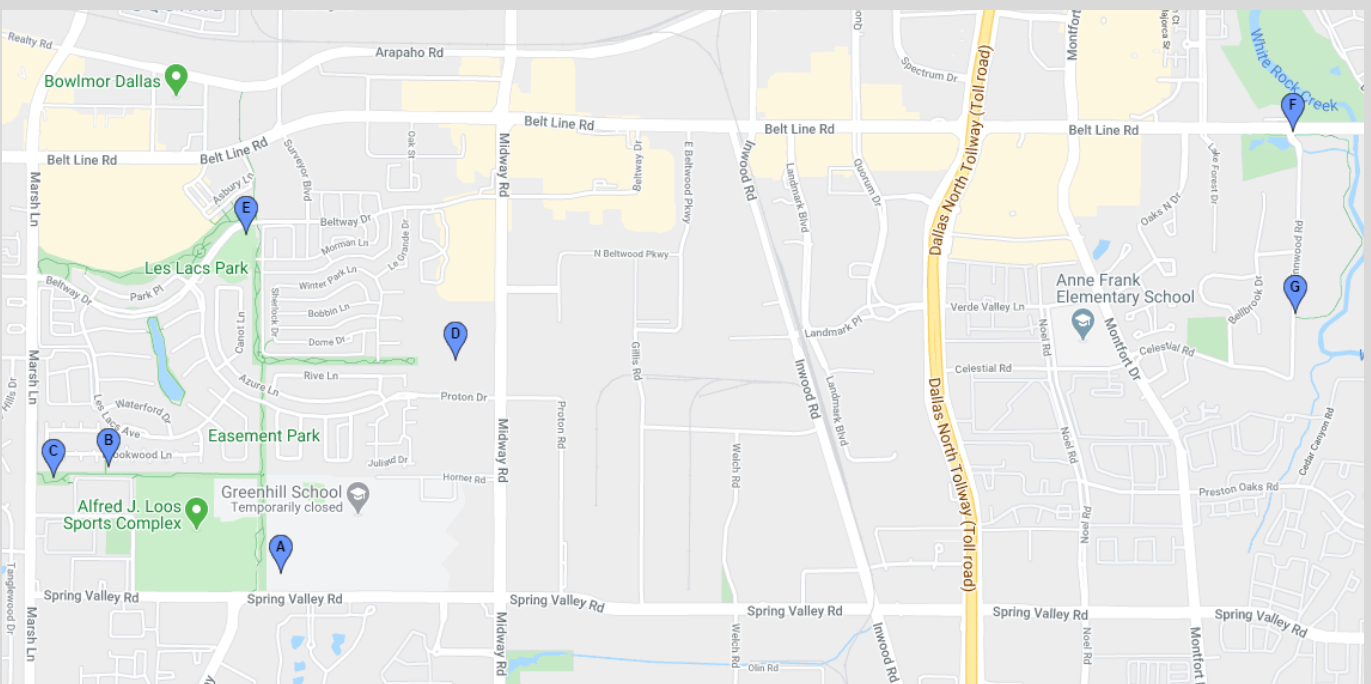
Seven optical video cameras were installed along Linear, Redding, and White Rock Creek Trails. The Town's goal is to increase neighborhood safety in areas that can sometimes feel more isolated. Optical cameras record in high definition and store videos on their hardware until the storage is completely full, overwriting itself approximately every seven days.

Investigators can request to pull stored footage when a criminal offense or public safety incident is reported. Additionally a live feed view is available to patrol officers in case they receive a call for service in the area. The officers can pull up the software on their in-car computers and check the footage from each camera. This can help provide a real-time coverage of these remote areas.

In the future the Town plans to upgrade older, pre-existing cameras by the Finance building, the Addison Athletic Center, and other public locations into high definition cameras. The software will operate on one cloud-based program accessible by computer.

None of these cameras have been or will be equipped with any kind of Facial Recognition technology, automatic or manual alerts, or triggers to save recordings. The cameras only exist to provide video footage of current or recent events. The cameras and software are not associated with Vigilant Solutions.

Optical Camera Locations



Council Approved Guiding Principles

Town Policy

To build and maintain trust within the community we serve it is essential that the Town develop a set of guiding principles to properly use the data derived from our LPR and optical camera systems. These principles will ensure the Addison Police Department develops and implements proper operating procedures. Transparency and accountability for these systems is incredibly important and will remain at the forefront of all our decision-making processes.

Below are five recommended principles regarding LPR use.

1. LPR systems should be used by the police department only to investigate hits and other circumstances in which law enforcement officers reasonably believe that the plate data are relevant to an ongoing criminal investigation.
2. The Town (police department) should not store data about innocent people for any lengthy period. Unless plate data has been flagged, retention periods should be measured in days or weeks, not months and years.
3. Citizens should be able to find out if plate data of vehicles registered to them are contained in our police departments data base.
4. The Town (police department) should not share plate data with non-law enforcement, third-parties. The police department will also not share data with other law enforcement agencies that do not follow proper retention and access policies or do not have clear policies in place to ensure such practices are followed.
5. The police department will report our data usage publicly and on an annual basis.

Auditing and Transparency

Two audits take place each quarter to protect from hacking or misuse. Internal personnel examine software use, relevant case information, and reasons for searches. External contractors review attempted log-ins, general functioning of hardware, and any data breaches. No misuse has yet been discovered but personnel will remain vigilant.

This report serves as a summary of use to City Council and the Addison citizens to ensure best practices and transparency.

Facial Recognition Technology

Explanation of Computer Software

Vigilant Solutions provides law enforcement a suite of programs including LPR and Facial Recognition (FR). Law enforcement personnel use LPR on their in-car computers and their desktops to receive real time alerts from neighborhood enclosures or to sort through previous license plate scans; again, there is no video footage, driver photos, or any personal information available from Vigilant Solutions' computer database of license plate scans.

FR is an entirely separate program from LPR. The goal of this search is to provide a possible identity for a wanted person in an active criminal case so a detective can then independently develop probable cause. Only specially trained and certified investigators with legitimate law enforcement purposes can use this software. The investigator selects a picture of the suspect from social media, surveillance cameras, body cameras, or other sources then compares it against a list of arrestees' book-in photos. An algorithm assists the investigator by analyzing the landmarks and unique features of a face and producing a gallery of inmate book-in photos ordered by most similar features.

The investigator must manually compare these book-in photos looking for matches in the wanted person's distinct facial features. When the investigator selects a possible match the software will compile a report showing the arrestee's name from the original correctional facility. Forwarding this report to the case's detective can give them a possible lead. It is crucial to understand that any information gained from FR technology is not by itself a component of any case. Detectives must seek fully independent evidence tying any suspect or person of interest to their offense. Absolutely no enforcement action will be taken on a computer-generated FR result alone.

Furthermore, law enforcement is aware that any attempt at live feed alerting from optical or body-worn cameras would be highly inaccurate and entirely inappropriate. The Town will not explore this technology and will remain transparent if any changes in optical camera operations develop.

Successes in the Field and Beyond

Detectives have solved eight cases where a victim was targeted by a partially known or completely unknown person. Investigators discovered FR software was extremely helpful for identifying suspects on social media if they posted high quality pictures of themselves despite using false or incomplete profile names.

Using this method arrest warrants were written for the suspects of two residential burglaries, a commercial burglary, an aggravated robbery, and a case of credit card abuse.

LPR Use: Patrol

Neighborhood LPR System Alerts

Addison officers have an additional tool to help intercept possible threats in our residential areas. Officers receive immediate alerts from neighborhood LPR equipment on their in-car computers about vehicles whose license plates are tagged by the State of Texas as stolen, belonging to a wanted person, or whose owner is missing. An instant alert showing this vehicle information and its location is distributed. Officers then intercept these persons and take appropriate action.

Officers have used this system to find three critical vehicles in the Les Lacs neighborhood. One vehicle belonged to a missing person who was able to be located and confirmed to be in good health. Another vehicle registered to someone with felony theft warrants was quickly contacted and the owner arrested. Lastly officers recovered a stolen vehicle after it drove into the neighborhood and parked on the street.

In-Car Alert Example

The screenshot displays an in-car alert interface. At the top, an orange banner with a warning icon reads "STOLEN VEHICLE OR VEHICLE/BOAT PARTS". Below this is a photo of a dark blue sedan. To the right of the photo, a blue header reads "EXACT MATCH ALERT". Underneath, there is a blurred image of the license plate, a "SAVE" button, and a "DELETE" button. Below the license plate image, a "DETECTION" section shows the license plate "BA13868". To the right of this are "MAP" and "NEAREST ADDRESS" buttons. Below that, a "HOTLIST RECORD" section shows the same license plate "BA13868" with a checkmark icon and an "ADDITIONAL IMAGES" button. At the bottom, a "DETECTION DETAILS" section lists: "DATE/TIME OF SCAN" as 08-13-2019 11:27 AM, "SCANNED BY" as Kyle Huerfano (916) 808-0450, "CAMERA NAME" as MobileCompanion, "HOT PLATE" as BA13868, and "ALERT TYPE" as Stolen Vehicle or Vehicle/Boat Parts. On the left side of the interface, there is a list of "ADDITIONAL HITS AVAILABLE" with a count of 142. The list includes several entries for "STOLEN VEHICLE OR VEHICLE/BOAT P..." with license plates 44E7198, PL4790, 0LV7022, BA13868 (highlighted in blue), and 7L0861.

LPR Use: Patrol

Commercial Data Alerts

Another source of information about activity in the town comes from commercial data. License plates are routinely scanned by tow trucks, insurance recovery vehicles, private investigators, and other individuals as they look for their own vehicles of interest. These saved scans can be viewed by law enforcement just like the scans coming from our neighborhood LPR equipment.

Commercial data gatherers can only view certain information about their scans. However Addison personnel can both read all their scans and also set up the same alerts as the ones from our neighborhood systems. Using data sourced from these vehicles on-duty patrol supervisors are alerted of critical vehicles in our business parking lots, intersections, apartment garages, and other locations within the city limits. These specific commercial data alerts have led patrol officers to recover and process an additional nine stolen vehicles parked in Addison.

After a vehicle is stolen in Addison or a major crime is reported, patrol supervisors can use their desktop LPR software to begin looking for possible suspect vehicles scanned in the area. Techniques used include looking for scanned vehicles in nearby intersections, checking neighborhood LPR scans, and setting up additional alerts for freshly stolen vehicles. Once a supervisor finds the vehicle they can then determine a possible workplace or residence to send officers to locate the suspect. This is an incredible force-multiplier for patrol officers as they can focus their energy and time on only the locations with the greatest chances of finding the suspects.

Case Studies: Investigatory Successes with LPR

After searching for a stolen vehicle used in a recent robbery in Addison, patrol supervisors were alerted that the plate had been scanned by a commercial vehicle in one of our apartment complexes. Officers were able to conduct surveillance on the area looking for suspects. Though the potential suspects fled on foot the officers recovered the vehicle, obtained a search warrant, and found evidence to progress their investigation.

Officers received a 911 call that a suspect was continuously attempting to strike a victim's vehicle with his truck following a road rage incident. The victim was able to provide the suspect's license plate but Officers could not find him at the registered owner's address. Using LPR detectives found a possible new home address and saw the truck in central Dallas. The truck was seized and processed for evidence after obtaining a search warrant.

LPR Use: Criminal Investigations

Identifying Suspect Vehicles

The Vigilant LPR desktop software allows investigators to sit at their computers and search through all commercial and neighborhood scans. Investigators use various filters for date, time, location, and agency to look for possible suspect vehicles and progress their assigned cases. Many times they are able to locate a match using witness descriptions like a white truck or a silver SUV with black rims. This can turn into a license plate and an actual photo of the suspect vehicle if it was scanned on the way out of town.

If the vehicle was not scanned immediately before or after the offense investigators will expand the parameters of their searches. If a decal, rim type, damage, or other unique marker on the rear is noted investigators can scan the entire area for weeks looking for that exact vehicle to come up. This is a tremendous help to detectives as they do not have to spend days driving through apartment parking lots out of town looking for suspects. In many cases suspects live further away than is reasonable to randomly drive to, which would otherwise halt the case prematurely.

Once investigators have identified the suspect vehicle they can use other software to determine the registered owner, any contacts with that vehicle by other police agencies, associated persons, and possible home addresses. If the vehicle was used in the offense it can be located and examined with a search warrant which often produces helpful evidence such as receipts, masks, or stolen items.

Investigators have identified suspect vehicles for serious offenses including two residential burglaries, an aggravated assault, and multiple vehicle burglaries. In a recent home invasion investigators were able to search the suspect vehicle's LPR scans and find a recent home address for the him. Officers arrested him on the warrant and found additional evidence from our offense after executing a search warrant on the vehicle.

Solving the Case

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Phase One: Successes and Challenges

Neighborhood LPR Performance

Hardware for the neighborhood equipment is operating as expected. The hardware was expected to accurately scan a high percentage of metal license plates. Regular audits have indeed shown that to be true. Besides occasionally removing physical obstructions like tree branches the LPR equipment has not required adjustment, replacement, or repair.

Investigators discovered many paper buyer's tags were also scanned if the tag was unwrinkled and in full daylight. Though the ability to capture some paper tags was not an expected feature it has been extremely helpful in several investigations.

The neighborhood LPR equipment was installed with standard definition (SD) technology. Disappointingly this hardware type does not capture paper tags at night nor tags without some sort of laminate or tape on top. Nighttime scans of metal license plates are sometimes inaccurate and unable to be verified.

Personnel are working to see if high definition (HD) equipment is a possible option to improve accuracy. The SD hardware could be sold back to Vigilant Solutions and replaced with HD versions with minimal cost.

Software Functionality of Alerts

Personnel needed a few months to fully set up the neighborhood and commercial alert systems. Misunderstandings with Vigilant Solutions led to State of Texas wanted alerts not being sent to patrol officers for the first few months of neighborhood systems operations. Perfecting which specific alerts to send to which personnel is an ongoing process as the software's capabilities evolve.

A new update called a "Missing Plate" report was recently installed in our existing neighborhood equipment. This feature will trigger a scan for all moving objects above a certain speed to help document vehicles with flawed, unreadable, or no license plates.

Though Vigilant Solutions already guarantees a high percentage of accuracy for metal plates, all available measures will be taken to capture the few remaining undetected vehicles in our neighborhoods. Personnel will continue to implement additional upgrades as they become available and seek out all technology to improve operations.

Phase Two: Plans for 2020 & Beyond

LPR Expansion Project

Identifying over a dozen suspects and recovering multiple stolen vehicles has made it clear to patrol officers and investigators that the neighborhood LPR systems are incredibly helpful in solving crime.

Despite only having eight locations with we have obtained over 3.3 million license plate scans from our LPR equipment. The proof of concept design has demonstrated the sheer quantity of suspects that can be apprehended even when the equipment is placed in relatively low traffic areas.

To help increase safety in our office, entertainment, and multifamily neighborhoods Addison personnel are carefully preparing a Phase Two plan for additional LPR equipment to present to Council. Investigators hope to identify fleeing suspects on both major thoroughfares and common cut-through streets closer to the Town's borders. It is the goal to protect the Town from crime both originating from nearby cities and from those who flee from inside our jurisdiction to nearby highways. Addison will use the specific bond funds previously set aside for this technology. Investigators look to sister agencies successfully using Vigilant software like Coppell and Prosper to see that LPR equipment in intersections can be used effectively and correctly.

Solar Powered Trailers & Additional Covert Options

Addison personnel are exploring new technology released this year by Vigilant Solutions. One major concern of investigators and residents is increasing the protection of our entertainment districts and residential areas during a temporary spike in criminal activity. Several options include solar-powered movable trailers, poles, boxes, and other systems that can be deployed in hot spots.

Additionally there are options for covert LPR equipment on patrol and investigator vehicles. Some units are available to be mounted in the backseat of squad cars or placed on the inside of the windows. Units can be installed discretely on truck toolboxes, around bumper brush-guards, and vehicle frames.

Future Technology

Vigilant Solutions recently created a new cellular application with promising advantages. Officers can turn a cell phone into a competitive LPR scanning device enhancing flexibility in the field. This is a low cost innovation compared to traditional fixed or mobile equipment.

Addison is also interested in forging alliances with the Home Owner Associations, private businesses, and office parks who directly request to place their privately purchased LPR equipment by the entrances to their property.

Phase Two: Plans for 2020 & Beyond

Optical Camera Update

Addison currently has over a dozen cameras scattered across the parking lots of Town-owned buildings. These cameras are stored on several different operating systems. Some are inoperable, some have very low image quality or record in black and white, and some are live feed only. Currently these cameras are not easy to access by law enforcement or Town personnel and therefore can provide only minimal leads in criminal cases.

Personnel are working to update and consolidate all optical cameras to one functioning system. Once this is accomplished additional Town-owned locations will be considered. Any future plans to cover more public areas will be presented to Council.

The cameras will serve only to review footage of previously reported criminal activity and to increase feelings of community safety. No unnecessary review of footage nor implementation of facial recognition technology will occur. Furthermore the increase in cameras will not be considered any sort of replacement for the daily expected patrol officer park checks and general presence in the neighborhoods.

