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   Trip Generation Rates for Various Sites

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13. Abstract

The primary objective of this pilot study was to examine six types of land use of interest to the Louisiana Department of Transportation and Development (DOTD): apartment complexes, urgent care facilities, dollar stores, car washes, drive-thru banks, and drive-thru daiquiri/boil shops. This research aimed to answer six questions: (1) How much variability is there in the trip rates among the sites and throughout the week? (2) Are the trip rates significantly different from ITE, so as to warrant further determination of rates? (3) Is variability with contextual factors apparent? (4) What should be the priority for determining new trip generation rates for use in Louisiana, as evidenced by deviation from ITE and potential impact on traffic planning? (5) Can new micro-radars provide more accurate counts? (6) Can third-party mobility datasets provide accurate count data for computing trip rates? To answer these questions initially, two types of measuring devices were considered: counting cameras, which provide classification counts from

video, and forward-firing micro-radar devices. Initial tests with counting cameras at the sites showed they were unsuitable for the selected sites' configuration. The micro-radar devices were used next, and despite some operational issues, they provided a more reliable data source. To ease counting, a computer vision tool based on the YOLO algorithm was developed and applied to recorded video from the sites. Finally, both of the micro-radars and the computer vision tool became the primary tools for data collection.

Initially, eight sites were selected for each of the six land use types from three DOTD Districts: Districts 05, 61, and 62. Two sites were selected for each land use type as backups, with the goal of obtaining complete measurements from six sites per land use type; ultimately, a total of 38 sites were used. The sites were selected to provide variability in three types of contextual data: AADT for the nearest roadway, population density, and jobs per worker. As far as possible, each site had a unique combination of these three variables, which were measured as either high or low.

Schedules for measurements were developed to allow data collection on five weekdays at each site within a seven-day period. Schedules were designed to spread sites geographically and temporally, so that seasonal and local variations would be consistent across all land use types. Generally, data collection hours ran from early morning to evening at each site, depending on the land use type. Measurements were scheduled for the fall of 2024 and the winter-spring of 2025, with no collection when schools were not in session. Due to missing information identified during data processing, data collection at two sites was repeated in the fall of 2025.

Following the technology testing, two micro-radar devices were acquired and deployed for the fall data collection. However, problems arose with the technology, including phantom vehicle detections at some sites, technical issues with device setup, and device damage from frequent installations and deinstallations. As a result, the micro-radar devices were abandoned at the end of 2024, and video cameras replaced them, using a software called YOLO to derive counts from the video. All counts were verified through a sample visual inspection of the recorded video. This accuracy was reported for each monitored driveway, and adjustments were made to the automated counts. The count data were then analyzed to produce trip rates, which were compared with ITE rates for the most similar land use type in the ITE Manual. Analysis was also conducted to determine whether contextual factors influenced trip rates. In all cases, it was found that the estimated rates differed from the ITE Manual rates and that contextual factors play an important role in determining trip rates. In determining priority for measuring Louisiana trip rates, three factors were considered: the size of the discrepancy from ITE trip rates, the overall magnitude of trips likely to be generated by a site, and the extent to which contextual factors are likely to influence trip rates. Based on these three criteria, the following is the order of importance for determining trip rates in Louisiana: drive-thru banks, drive-thru daiquiri/boil shops (to be separated into two different land use types), apartment complexes, car washes, dollar stores, and urgent care facilities.

In August 2025, ITE released the new, 12th edition of the Trip Generation Manual. A review of the six land use types was then conducted and incorporated into this report. The latest rates are used in the results section of this report.

An alternative method of determining trip rates was also explored. This method used available third-party data on site visits. In all cases, the available data did not correlate well with ground counts of visits. It is concluded that such data are not useful for developing trip generation rates for specific sites at this time.

Project Review Committee

Each research project will have an advisory committee appointed by the LTRC Director. The Project Review Committee is responsible for assisting the LTRC Administrator or Manager in the development of acceptable research problem statements, requests for proposals, review of research proposals, oversight of approved research projects, and implementation of findings. LTRC appreciates the dedication of the following Project Review Committee Members in guiding this research study to fruition.

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Trip Generation Rates for Various Sites

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Acknowledgments

The authors wish to acknowledge the assistance provided by the Project Review Committee. We also wish to acknowledge the assistance of Kordell Carpenter of LTRC in collecting the required trip generation counts from the various land use sites investigated in this study. Finally, we want to acknowledge the DOTD District engineers for their assistance with our site data collection.

Implementation Statement

This research identifies differences between ITE trip rates and those in Louisiana for six land use types: dollar stores, drive-thru banks, urgent care facilities, car washes, drive-thru daiquiri/boil shops, and apartment complexes. Priorities for further research on these land use types were determined. Published ITE rates to date were not found to be accurate for any of the land use types in Louisiana, and contextual variables were found to influence rates for all six types.

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Introduction

Purpose of the Research

Like most other U.S. states, state and local transportation agencies in Louisiana rely on the Institute of Transportation Engineers (ITE) publication of trip rates to assess the traffic impacts of various development proposals [1]. However, there are several problems with Louisiana's reliance on these rates. First, the data on which they are based, while incorporating more urban areas elsewhere, are still dominated by data from large urban areas in the northeastern U.S. As such, they may not be applicable in smaller urban and semi-rural areas in Louisiana. Second, the rates are often derived from a very small sample of locations. For example, some rates are based on only three locations. Third, most sites from which the data were collected are reasonably well served by public transportation, whereas in most of Louisiana, there is little or no public transportation serving the land use types of concern. Fourth, some of the data are quite dated and were collected before many recent advances in the ability to make transactions through web-based and similar services [2] [3], as well as before the COVID-19 pandemic. For these reasons, the rates published by ITE may be inaccurate today.

Additionally, ITE trip rates are generally presented solely by land use type and primarily as a function of floor area. As shown in recent research conducted for the Louisiana DOTD [4], contextual factors may significantly affect the trip generation rates of some land use types. It is therefore desirable to explore the extent to which contextual factors should be used to determine appropriate trip rates for specific land use types in Louisiana.

The purpose of this pilot project was to examine six land use types of interest to DOTD: apartment complexes, urgent care facilities, dollar stores, car washes, drive-thru banks, and drive-thru daiquiri/boil shops. This research is based on responses to the following six questions:

1. How much variability is there in the trip rates among the sites and throughout the week?
2. Are the trip rates significantly different from ITE, so as to warrant further determination of rates?
3. Is variability with contextual factors apparent?
4. What should be the priority for determining new trip generation rates for use in Louisiana, as evidenced by deviation from ITE and potential impact on traffic planning?
5. Can new micro-radars provide more accurate counts?
6. Can third-party mobility datasets provide accurate count data for computing trip rates?

Report Outline

The next section of this report is the Literature Review. The following two sections provide the Objectives and Scope of the research on this project, as originally defined. The next section describes the Methodology applied in this project to select sites for measurement, select the technology to measure trip rates, and execute data collection, analysis, and testing of the six primary hypotheses of this research.

Following the Methodology section, the Results of applying this Methodology to the 38 sites selected for this project are documented. Conclusions are drawn relative to the six hypotheses, and Recommendations are made for further research. References are also provided following the conclusions. There are also three Appendices providing results of the pilot tests, details of the measured sites, and validation tests for the sites.

Literature Review

This section provides an overview of prior relevant studies on recent advances, challenges, and methodologies for computing and measuring trip rates by individual land use types. The literature on the importance of contextual factors in determining trip rates for various land use types was reviewed. There are five subsections. The first introduces the topic; the second discusses various factors affecting trip rates; the third focuses on data collection methods; the fourth provides a discussion of data analysis methods; and the last addresses the limitations and gaps identified in the Literature Review and outlines how these insights can guide future research to enhance trip rates in transportation planning.

Introduction

Over the past 20 years, considerable research has examined ways to modify ITE trip rates. Prior studies indicated that auto trips tend to be overestimated in urban/downtown areas in large cities, where non-vehicle modes have a noticeable share of the trips [5]. This is because most data used to calculate ITE trip rates [1] were obtained in urban regions, where a majority of travel is by car [6]. Vehicle trip generation using ITE rates is frequently exaggerated in urban centers, mixed-use developments (MXD), and transit-oriented developments (TOD). For the first time, the 10th edition of the ITE Trip Generation Manual included new urban and person-based trip data to address this constraint [7].

In 2002, the Planning Department of the City and County of San Francisco identified adjustments to ITE trip rates [8]. Using data from the 15,000-household Metropolitan Transportation Commission 2000 Bay Area Travel Survey across nine counties in the San Francisco Bay Area, the study produced a lookup table of trip rates for different land use types [8]. Several adjustments to the ITE trip rates were recommended based on variables such as density, proximity to rail or ferry transit (e.g., within ½ mile, between ½ and 1 mile, and beyond 1 mile), and urban context (e.g., urban area, high-suburban area, low-suburban area, and rural area) [9]. NCHRP Project 8-51 estimated the internal trips generated at MXD sites. The methodology used a classification system to identify internal trips at MXDs and to reduce ITE rates based on internal capture levels [10]. It was found that estimation errors at MXDs decreased by approximately 50% compared with ITE-based methods when this method was applied [10]. Several studies have examined the impact of the built environment on trip rates. Clifton et al. [7] investigated the effect of the urban context on trip rates for three land use types: convenience stores, high-turnover restaurants, and drinking establishments. A total of 78 establishments located in a variety of settings, such as suburban and city centers, were surveyed.

Vehicle trip rates were obtained from site visitor surveys, entering and exiting person counts, and vehicle counts. The results showed that the adjusted models improved vehicle trip rates for convenience stores and drinking establishments relative to the ITE methodology, whereas no improvement was observed for high-turnover restaurants.

Factors Affecting Trip Rates

Numerous factors affect trip rates, including demographics, socioeconomic variables (e.g., population density, employment rates, availability of jobs, etc.), geographic area (e.g., urban, suburban, and rural), development area type (e.g., mixed-use development, transit-oriented development, etc.), land use type (e.g., residential, health care, commercial, etc.), age of data, availability of public transportation, parking categories, and regional transportation policies. Wilmot et al. [4] aimed to address some of the limitations of the ITE trip rates, which often lead to over-estimation of vehicle trips in urban areas due to their reliance on data collected predominantly from suburban sites over six decades. Their study focused on strip malls in Louisiana, with the hypothesis that the surrounding built environment significantly influences trip rates. To test this hypothesis, sites were selected with varying population densities, land use diversities, and traffic intensities. The results showed promising outcomes, with regression models reducing the root mean square error (RMSE) by 36% compared to estimates from ITE trip equations. This study suggested the need to investigate other land use types for a comprehensive understanding of trip rates. Howell et al. [11] investigated the impact of data age and land use taxonomy on transportation impact assessments. By analyzing ITE trip rates, the researchers assessed the correlation between data age and vehicle trip rates. They found that a 1% increase in data age corresponded to a 1.7% increase in vehicle trip rates for certain categories, highlighting the need to use up-to-date data in transportation impact analyses.

Millard-Ball [12] studied the accuracy of ITE trip rates, particularly examining their suitability for various urban contexts. The study addressed this gap by distinguishing between average and marginal trip-rate estimates and discussing their implications for the appropriateness of ITE rates for specific analyses. The results indicated differences between ITE rates and actual trip rates, particularly in urban areas where alternative modes of transportation are common. The study also concluded that the ITE trip rates are not limited solely to overestimating vehicle trips and failing to account for factors like transit access and land use mix, but also because they do not consider the impacts of development to reduce traffic. The difference between average and marginal trip rates is highlighted, showing that ITE rates represent averages and may not accurately reflect the marginal impact of a development project.

Schneider et al. [13] tackled the challenge of adjusting ITE vehicle trip rates in smart-growth areas, driven by the scarcity of trip generation data in such locations. Focusing on smart-growth areas in California, including Los Angeles, San Diego, San Francisco, Oakland, and Sacramento, the study examined 65 sites to develop and validate adjusted models. The findings revealed notable discrepancies between ITE estimates and actual trip rates in these areas. Specifically, during peak hours, the ITE rates overestimated vehicle trips by a factor of 1.8 for morning trips and 1.9 for evening trips, underscoring the need for adjustment methods tailored to smart-growth contexts. Kwigizile and Teng [14] conducted a study to address the spatial effects in trip generation models, particularly due to the spatial distribution of observations, which can significantly influence analysis methods and conclusions. The study identified some limitations, including the focus on a specific region (Las Vegas Valley), which may limit the ability to apply to other areas.

Data Collection Methods

Data collection methods are important for understanding mobility behavior across various populations. Household travel surveys (HTSs) have traditionally been the basis for collecting trip generation data. However, the samples for these surveys are generally so small that they cannot provide a good option for developing site-specific and land-use-specific trip rates. Video-based observations offer a comprehensive way to monitor and analyze traffic flows and trip rates, though they require extensive post-processing. Cameras specialized for traffic studies can provide automated counts. Radar-based traffic count devices can detect and track different road users over a wider spatial range and over a longer temporal range (e.g., after sunset), but this type of device typically requires more sophisticated field configuration, so a lower device rotation frequency is preferred. Mobile phone data, with its extensive coverage, offers a novel approach to estimating trip rates by capturing population movement patterns, but sampling issues must be addressed to protect privacy. Additionally, social media analytics are used to provide indirect indicators of trip rates from geotagged posts and check-ins, but, as with other data sources, sampling bias (e.g., by age group) needs to be accounted for.

Wilmot et al. [4] employed video imaging and Bluetooth/Wi-Fi signal detection methods for data collection. Correlation coefficients between Bluetooth/Wi-Fi detections and manual vehicle counts ranged from 0.62 to 0.97, indicating the effectiveness of these detection methods. Image recognition from video recordings emerged as the most accurate method, achieving 90% accuracy. The study emphasized the potential of using secondary data sources to estimate trip rates, highlighting avenues for future research to improve efficiency and reduce manual effort. The absence of additional Bluetooth/Wi-Fi signal detection devices to identify vehicles passing by multiple times could have impacted count accuracy. Future studies are encouraged to explore further automated data collection methods and improve image processing techniques to minimize undercounting and over-estimation in trip-rate measurement.

Millard-Ball [12] used prior surveys, including data on housing unit numbers from the 2009 American Community Survey and square footage estimates from the 2003 Commercial Buildings Energy Consumption Survey (CBECS), to estimate total land use and trip generation for residential and commercial areas. Schneider et al. [13] used pneumatic tube counts, door counts, and intercept surveys at various study sites. Kwigizile and Teng [14] focused on home-based work trips in the Las Vegas Valley to test for the presence of spatial relationships in trip-rate variables and evaluate alternative methods for defining spatial connectivity in trip-rate models.

Bwambale et al. [15] addressed the limitations of traditional approaches to estimating trip generation models, which rely on costly HTSs. This research was motivated by a growing interest in using global data sources, such as mobile phone data, for mobility modeling. The objective was to develop a hybrid framework that incorporates demographic information as latent variables in trip generation models using mobile phone data. They validated the proposed framework to enhance the accuracy of trip-rate predictions and investigated the potential of mobile phone data for improving other stages of the transportation-planning process. The validation results showed the feasibility of using mobile phone data for econometric travel-behavior modeling and travel-demand estimation. The hybrid framework improved various stages of the transportation planning process, with parameter signs and t-statistics indicating that both the hybrid model with predicted demographics and the traditional model with observed demographics captured similar trip generation behavior. Although the study demonstrated the applicability of mobile phone data in transportation planning, limitations were noted, including a small sample size and limited demographic information in the dataset, which may introduce non-random sampling bias across demographic groups. It was suggested that future research focus on expanding the dataset, improving demographic stratification, and exploring additional applications of mobile phone data in transportation modeling to address these gaps.

Yang et al. [16] aimed to overcome the limitations of traditional trip generation modeling methods by proposing a data-driven approach utilizing location-based social network (LBSN) data and cellular phone data to gather information on points of interest (POIs), check-in numbers, and other variables related to land use type and trip attraction, estimate trip production and attraction for urban residents and non-local travelers, and validate the proposed modeling method through a case study in Nanjing, China. The results indicated an improvement over traditional transportation planning methods by using LBSN data to model trip generation functions, thereby reducing human resources and funding costs. However, the study acknowledged some limitations, including reliance on historical trip and POI data, which may limit the transferability of the methods to other cities or regions. Privacy concerns and variations in POI spatial coverage across different regions could also affect model effectiveness.

Al Naim [17] investigated the potential of using social-media data analysis to understand how travelers utilize social media and how it influences their decision-making process. The data were collected from various online platforms, including user-generated content, reviews, recommendations, and discussions related to travel experiences and destinations in the city of Adelaide, Australia. The study acknowledged several limitations, including the need for a larger, more diverse dataset to enhance generalizability, as well as potential biases and reliability issues with user-generated content.

Pourebrahim et al. [18] addressed the challenge of collecting travel-demand data for efficient urban sustainable solutions by exploring the integration of social media data (e.g., Twitter) with traditional data for trip-distribution modeling. The study focused on predicting home-to-work flows between census tracts in New York City. Utilizing geolocated tweets posted within the city from June 2015 to May 2016, which were obtained from the System for Observation of Populous and Heterogeneous Information (SOPHI) dataset maintained by the Data Science Initiative (DSI) at the University of North Carolina at Charlotte, the researchers developed three models (gravity, neural network, and random forest) to predict home-to-work flows between census tracts, using Twitter population data as an input variable. The study concluded that transportation planners and policymakers can make more informed decisions leading to sustainable urban mobility solutions by using such data. However, the study acknowledged limitations, including its focus solely on home-to-work flows, leaving room for further exploration of other trip purposes. The research could be expanded to include a broader range of social media platforms and additional variables to enable more comprehensive modeling. Further investigation is needed to explore the scalability and generalizability of the models to different cities and regions.

Patrick and Marcela [19] investigated new technologies and big data as part of the evolving landscape of transportation survey methods. Using various data collection methods such as web-based surveys, activity-travel diaries, and social-interaction information, the study gathered diverse and multi-dimensional data encompassing values, attitudes, travel behavior, and demographic information. The methodology involved workshops, discussions, literature reviews, and case studies to explore the impact of new technologies, data collection methods, and survey designs on transportation research. The results indicated a growing use of smartphones and tablets for web-based surveys, emphasizing the need for adaptive survey designs for mobile respondents. The study highlighted the potential of gamification to make surveys more engaging and appealing. Challenges were identified in analyzing big data due to its size, variability, and multi-dimensionality, necessitating new analytical methods. Continuous surveys and passive data collection methods were favored for analyzing behavioral changes and policy impacts over time.

Data Analysis Methods

Regression is widely used for its ability to quantify the relationship between trip rate factors and predicted trip rates [20] [21] [22]. Factor analysis is used in identifying underlying factors that influence trip rates [23]. Simulation techniques using a traffic simulation model, an emissions model, or a modal emissions model enable the creation of virtual scenarios to assess the impact of trip rates on emissions [24] [25]. Machine learning algorithms offer advanced capabilities in predicting trip rates based on large and complex datasets [26] [27] [28] [29]. Wilmot et al. [4] used regression to investigate the impact of the surrounding environment on trip rates at strip malls, with a focus on reducing the root mean square error (RMSE) of trip rates. Schneider et al. (2015) used factor analysis and developed two linear regression models to adjust ITE trip rates across 50 smart growth areas in California for morning and afternoon peak hours. With an adjusted R^2 of approximately 0.3 and 0.29 for the morning and afternoon peak hour models, respectively, it was concluded that the models are appropriate to be used for "single land uses in several common categories, such as office, mid- to high-density residential, restaurant, and coffee/donut shops" and are suitable for planning-level analysis. Howell et al. [11] compared behavioral patterns across different land use types through statistical tests such as t-tests, providing insights into the implications of using outdated data in transportation planning.

Al Naim [17] applied data pre-processing, sentiment analysis, and predictive modeling. Clustering approaches were applied to categorize social media data into themes such as location, environment, safety, and transport. Machine learning techniques were utilized to analyze the data and extract insights. The results showed that the predictive model, trained on labeled data processed through sentiment analysis, achieved high accuracy in predicting travel-related sentiments. Data pre-processing techniques improved data quality by reducing noise and anomalies. Clustering approaches categorized social-media data, providing valuable insights for trip planning. The study demonstrated the potential of social media data analysis to enhance the travel experience and help travelers make informed decisions. Travel industry stakeholders could leverage sentiment analysis and predictive modeling to understand traveler preferences and tailor their services. Travelers could benefit from personalized recommendations and insights derived from social media data analysis, leading to improved trip planning experiences.

Kwigizile and Teng [14] used various data expansion techniques to estimate the actual number of trips per district. Spatial autocorrelation tests were conducted on the variables, and trip attraction and trip production regression models were developed by explicitly incorporating the spatial relationship of observations. Different definitions of spatial relationships, including spatial lag and spatial error models, were utilized to develop the models. The findings indicated significant spatial autocorrelation in trip attraction variables but not in trip production variables. Using a geographical connectivity matrix with elements defined by separation, the model emerged as the best fit, outperforming models without spatial variables. The study underscored the importance of considering spatial effects in trip generation models and highlighted the impact of defining spatial connectivity on model accuracy. Yang et al. [16] established relationships between trip rates and POIs, highlighting the impact of land use composition on trip rates. The methodology involved four primary steps: feature selection, an exploratory approach to building trip models, model selection, and model evaluation. Selected models were evaluated using various statistical tests to validate model performance and the significance of explanatory variables.

Pourebrahim et al. [18] showed that the models performed better when Twitter population data were included in the model specification, with the random forest model outperforming the gravity and neural network models, achieving an R^2 value of 0.78 compared to 0.64 and 0.61, respectively. Linear mixed models (LMMs) have also been used in transportation studies to account for hierarchical or grouped data structures, such as repeated observations from the same site or observations clustered within geographic areas [30] [31]. These models incorporate both fixed effects and random effects, allowing for the control of unobserved heterogeneity while improving the generalizability of the results. LMMs are particularly useful in studies in which multiple measurements are collected across sites or over time [32].

Limitations and Future Directions

Several limitations and gaps in prior studies can be identified and used to guide future research to improve trip rates used for planning purposes. To address some of the limitations identified in previous studies, the following suggestions are offered. First, there is a need to examine a range of land use types beyond the few that have been the focus of much of the literature. Second, various contextual factors should be investigated to determine whether they have a significant impact on trip rate estimates. Third, alternative technologies should be investigated for data collection. Among others that have not been tested previously, the use of smart/micro-radar and counting cameras are suggested as potential technologies. Fourth, the potential of various types of mobility data, such as cell phone location data and transaction records, to estimate trip generation rates should also be investigated.

Objectives

There were six primary questions being investigated through this research, including:

1. How much variability is there in the trip rates among the sites and throughout the week?
2. Are the trip rates significantly different from ITE, so as to warrant further determination of rates?
3. Is variability with contextual factors apparent?
4. What should be the priority for determining new trip generation rates for use in Louisiana, as evidenced by deviation from ITE and potential impact on traffic planning?
5. Can new micro-radars provide more accurate counts?
6. Can third-party mobility datasets provide accurate count data for computing trip rates?

These questions were asked regarding six land use types: apartment complexes, urgent care facilities, dollar stores, car washes, drive-thru banks, and drive-thru daiquiri/boil shops. The project resulted in recommendations for replacing ITE trip rates, further studying certain land use types, or accepting the trip rates provided by ITE, as well as outlining the most efficient ways to collect the data.

Scope

The scope of this project was exploratory. First, it explored recently developed technologies that may be used to collect data at site driveways instead of using people, road tubes, etc., to count vehicles arriving and departing. Second, it explored the extent to which trip rates vary by day of week and by site location and contextual factors. Third, it explored the extent to which there is evidence that the trip rates at sites in Louisiana are close to or depart significantly from the ITE trip rates [1]. Fourth, it sought to determine whether third-party datasets can substitute for real-time measurement of trip rates. It was not expected that this project would recommend new trip rates for use, but rather would identify priorities for further research to develop better trip rates for use in Louisiana. The budget and time allowed for this project permitted the identification of six land use types and the selection of approximately six sites for each land use type for data collection. These sites were selected to represent a range of values for three contextual variables: AADT, population density, and jobs per worker. Two levels of each of the three contextual variables were used, and it was stipulated that the six sites chosen for each land use type span six different combinations of these levels.

Methodology

To complete the work outlined in the project Objectives and Scope, nine tasks were completed:

1. Perform a literature review with respect to the issues under research in this project.
2. Develop a sample of sites of land use types to be measured, and develop a schedule for the measurement of these sites.
3. Conduct a pilot test of the micro-radar device to determine if it is suitable for use, and compare these results to those from counting cameras.
4. Collect the data using the devices found to provide the most accurate data.
5. Verify the data from approximately 10% of the measurements at each site.
6. Clean the data as necessary, based on the results of the verification.
7. Analyze the data to produce appropriate trip rates for each site and land use type for comparison purposes.
8. Acquire third-party count data for those sites for which it is available and compare results.
9. Document the research in a final report, and present this report to the PRC.

Task 1: Perform Literature Review

Library and internet searches were conducted on the research topics. These searches explored literature on contextual factors affecting trip rates from specific sites, data collection methods, and data analysis methods, developing a section on limitations and future directions. The results of this literature review are provided earlier in this report.

Task 2: Develop a Sample of Sites and a Schedule for Measurement

At the outset of the project, a meeting was held with the Project Review Committee (PRC). This meeting was intended to confirm the list of land use types to be measured and request that members of the PRC submit a list of recommended sites for each land use type within specific DOTD Districts. PRC members were asked to provide a substantial list of sites so that the variety of combinations of contextual factors could be obtained from the suggested sites. Three contextual factors were selected based on the earlier work of Wilmot et al. [4]: AADT on the adjacent roadway, population density, and jobs per worker. These were divided into two levels each, yielding eight possible combinations of contextual factors, of which six distinct combinations were selected for each land use type. At the same time, the sites were also checked using map images to determine whether each land use location was stand-alone or shared driveways with other land use types, leading to the rejection of several sites due to shared driveways. One or two sites also posed difficulties in locating the measuring devices appropriately. Once all these factors were taken into account, a list of 40 sites was submitted to the PRC for approval.

Using the approved list of sites, a schedule was prepared to measure trip rates. This schedule was based on having two devices available at two sites per week, allowing at least 24 hours between sites to permit battery recharging, and accounting for the travel time required for the installation and retrieval of the equipment. To make efficient use of time, sites were clustered by DOTD District, so that in any given week, sites in the same District were scheduled for measurement. The sites were also spread by District through the measurement period. The available time for measuring sites was fall 2024, from mid-August to mid-November, and winter-spring 2025, from mid-January through late May. Within these time periods, no measurements were scheduled when schools were closed. Several reserve weeks were identified at the end of the period that could be used due to weather events that might result in the cancellation of measurements earlier in the period, or for equipment failures or malfunctions.

Task 3: Conduct a Pilot Test of the Micro-Radar Devices

An apartment complex near LTRC was chosen for an initial pilot test. For this test, a micro-radar device was mounted on a utility pole, opposite the entrance to the apartment complex. A counting camera was co-located with the micro-radar device, and another camera was mounted facing across the entrance/exit of the apartment complex to operate in video mode. The video recorded by this second camera was intended to provide actual ground counts of entering and exiting traffic. The test was scheduled to run from approximately noon on Monday to approximately noon on Friday and was designed to provide data to compare visual counts from the video recording with those from the counting camera and micro-radar device. It was also designed to establish the battery life for each of these devices. The test was designed to take place in April 2024, so that decisions could be made on acquiring the needed technology over the ensuing three months, with the expectation of beginning the fieldwork in mid-August 2024, after schools were back in session.

A pilot test was then undertaken at two sites to determine the best location for the selected technology for comparison of results and to streamline on-site working procedures for operational efficiency. These sites were selected in Hammond from the PRC-provided list, but two were not included in the final list. These included a car wash and an apartment complex. The tests were used to compare automatic counting cameras and micro-radar devices, with video counts also obtained for a portion of the time for verification. This test was scheduled for late April 2024.

Task 4: Collect Data with the Technology Determined from the Pilot Test

Detailed plans were developed for each selected site, showing the site location, its driveways, and the location of utility poles or other available mounting equipment for device installation. The detailed site plans indicated where automatic counting devices and video cameras were to be located to provide verification data. The plans also provided information about the hours during which measurements were to be taken and the days of the week on which the site would be measured. Although the micro-radar devices were subsequently abandoned, the site plans were still used to position the video cameras.

Task 5: Verify the Data from At Least 10% of the Measurement Period

The measurement periods involved approximately 12 hours per day for five days, resulting in approximately 60 hours of measurement at each site. Verification involved six hours of measurement, or 10% of the total measurement period. Initially, because of limited battery life for the video cameras, video was available from most sites for a maximum of the first three days of measurement. Subsequently, external power banks were connected to the video cameras, enabling continuous video coverage throughout the week. Six hours of measurement were randomly selected from the available video footage and generally covered at least the morning, midday, and evening periods over two days. Verification consisted of visually counting the number of entering and exiting vehicles for each driveway over the selected six hours. These counts were then compared to the automated device counts. Reports were prepared for each site, documenting comparisons between the visual and automated counts, and are included in Appendix C. The resulting counts were classified as either acceptable or unacceptable.

Task 6: Clean the Data

It was expected that data cleaning would be required at many sites to address various issues that were anticipated to arise. One issue is missing data, where recording may have started later than intended or ended earlier, possibly due to battery life issues. Additionally, certain events at a site could require that some data be discarded or replaced. For example, in some locations, a large semi-trailer or other vehicle may obscure the counting device and require a particular hour to be discarded because of incomplete counting. Occasionally, a spurious count may occur, requiring deletion or replacement. When replacement was required, this was done using hot-deck imputation [33], where hourly counts were taken from another day with similar counts and used to replace the hours where problems occurred.

The measurement periods for each site were generally designed so that counts began at approximately noon on a specific day of the week and ended seven days later at the same hour (or later) as counts began. In this way, the day on which counts began would be combined with the day on which counts ended to provide a complete set of counts for that day. For example, if counting began at noon on a Tuesday, it would be scheduled to end at noon (or later) on the following Tuesday. The morning count from the last Tuesday was then combined with the afternoon count of the first Tuesday to provide a complete count for Tuesday. This combination of the two part-day counts at the beginning and ending of the count period were part of the data cleaning that was required. Finally, after reviewing the verification results, if either overcounting or undercounting was identified consistently for the hours used in verification, adjustment factors were computed for the automated counts to align them with the video counts.

Task 7: Analyze the Data to Provide Trip Rates

Several steps were required to analyze the data. After all the counts had been verified and cleaned, the next step was to aggregate the counts to every hour; counts could be obtained from the automated counts at five-minute, 15-minute, or longer intervals. The counts were aggregated by hour and by day. For each day, the maximum and minimum values, variance, standard deviation, and coefficient of variation were computed across the hours and across the five days. These computations identify the peak hour each day and the peak day across the week, and indicate whether counts are needed for an entire week.

ITE identifies several different rates (e.g., for the peak hour of the land use type, for the peak hour between 7:00 a.m. and 9:00 a.m. of the adjacent roadway, etc.). Prior to undertaking the analysis, the PRC was consulted to agree on the rates to be calculated. For most of the sites involved in this project, the floor area could be obtained from Google Maps. This was the primary variable for computing rates and was also likely to be the available information for a new development. The one exception to this was apartment complexes, where the number of units is used by ITE and was agreed upon as the basis for rates in this project. While some rates in ITE are based on employees, this information was generally unavailable on the project and would also be unlikely to be available for a new development. Five rates were identified that could be directly compared with those of ITE: the weekday average trip rate, the rate in the morning peak hour of the adjacent roadway from the MS2 system, the morning peak hour of the site, the evening peak hour of the adjacent roadway from the MS2 system, and the evening peak hour of the site. For each of these rates, the average was estimated. If the peak hour on the adjacent road fell outside the 7:00 a.m. to 9:00 a.m. period, the peak within that two-hour period was used to ensure comparability with the ITE rates.

Once these rates were established for all sites within a given land use type, a comparative analysis was conducted to determine whether contextual factors had a discernible effect on trip rates. Also, by averaging across all sites for a particular land use type, the rates could be compared with those of ITE. This allowed conclusions to be drawn on whether the ITE rates appeared reasonable for use in Louisiana and whether there was evidence suggesting that Louisiana rates might differ significantly from the ITE rates.

Task 8: Compare the Counted Rates with Third-Party Data

This task was to determine whether data from third-party mobility sources were comparable to field-collected data. Human mobility records can be collected via mobile devices using Location-Based Services (LBS). LBS data are considered to have greater spatial accuracy than cellular data. These data are passively collected over a broader spatial scale over a longer time span at lower cost, providing rich spatial and temporal information on human activities. However, there are concerns about data representativeness and sampling in LBS data (e.g., who owns a mobile device and who enables LBS on their device). The employed data source provides daily visit counts with an hourly breakdown. The data are continuously updated and released monthly. The dataset covers 306,520 POIs in Louisiana during 2024-2025. POIs are public places with their categories defined by the industrial code (i.e., the North American Industry Classification System, NAICS). Approximately 10% of the total population in the U.S., with state sampling variations, was covered in the dataset.

The methodology consisted of the following steps:

1. Comparison of normalized mobility counts with actual counts.
    a. The normalized visit counts from the third-party mobility data (using state-level scale) were compared to the actual counts from the study sites.
    b. If the differences between normalized counts and observed counts were within an acceptable margin of error, the normalized counts were considered usable for trip rate studies without further adjustment.

2. Correlation analysis between raw mobility counts and actual counts.
    a. If normalized counts did not align closely with actual counts, the raw visit counts from the mobility dataset were compared with actual counts.
    b. A coefficient of determination (R^2) was calculated to assess the strength of the linear relationship between raw mobility data and observed data.
    c. A high R^2 value would indicate that the raw mobility data could serve as a reliable predictor of actual trips, even if the provider's normalization process did not yield accurate results.
    d. A low R^2 value would indicate that the raw mobility data are probably not suitable as a predictor of trip rates.

Task 9: Document the Results in a Final Report and Presentation

The final step for this project was to document the methodology and results of the research in a final report and prepare a presentation for the PRC based on the report. A technical summary was also prepared. This document represents part of the fulfillment of this task.

Discussion of Results

Task 1: Literature Review

The literature review was completed during the first 15 months of the project and is incorporated into this report. The review supported the value of conducting this research and identified gaps in the literature on this topic. The literature review further guided this research and the conclusions and recommendations developed from it.

Task 2: Develop a List of Sites and Schedule the Measurement

The PRC was asked to identify potential sites for each of the six land use types. The research team received 98 recommended sites: 59 sites from District 62, 22 sites from District 05, and 17 sites from District 61[1]. The sites were pooled to select 48 that span different Districts, have diverse land uses, and represent a variety of contextual factors. In the process, the availability of mobility data collected from mobile devices was considered a secondary consideration to complete the proposed tasks. The following is a detailed description of the selection steps:

- **Step 1:** Data of three contextual factors were collected for each site. The three contextual factors were based on the previously completed project [4]; see Table 1.

Table 1. Contextual factors used in this research

Contextual factor	Grouping threshold	Data source
Population density	1 = less than 1,000 persons per square mile 2 = 1,000 or more persons per square mile	U.S. Census 2020
Jobs per worker ratio	1 = less than 1.25 jobs per worker 2 = 1.25 or more jobs per worker	U.S. Census 2020
AADT in the vicinity	1 = volumes less than 16,312 vehicles per day 2 = volumes 16,312 or more vehicles per day	DOTD MS2

- **Step 2:** Sites were first grouped by land use type. Within each land use type, sites were selected across a range of contextual factor levels rather than focusing on specific levels. The purpose was to test factor significance in these land use types without excluding any potential contributing factors. 16 sites lacked proximate AADT data; these sites were excluded.

[1] District 05 is in north Louisiana between Ruston and Monroe; District 61 is the Baton Rouge area; District 62 is in south Louisiana on the north shore of Lake Pontchartrain.

- **Step 3:** When there was a tie situation in Step 2, sites were selected from different Districts. The purpose was to compare sites within each District by land use type, and to capture District-to-District variations as much as possible.

The steps described above led to the site selection result summarized in Table 2.

Table 2. 48 selected sites by District

Land use type	**District 05**	**District 61**	**District 62**	**Total**
Apartment Complexes	2	2	4	8
Urgent Care Facilities	2	2	4	8
Dollar Stores	2	2	4	8
Car Washes	2	2	4	8
Drive-Thru Banks	2	2	4	8
Drive-Thru Daiquiri/Boil Shops	1	2	5	8
Total	**11**	**12**	**25**	**48**

Of these 48 sites, 36 were selected as primary sites, with 12 additional sites as reserve sites, to be used if problems arose with any of the primary sites. Prior to scheduling measurement, each site was examined to determine how many driveways existed on the site and whether multiple driveways would require more than one measuring device. Sites were also checked to ensure that driveways were dedicated to the land use type in question, so that counts would relate specifically to that land use type.

To prepare the schedule, details of school breaks and other special days were collected, and a calendar for possible dates of measurement was prepared. Measurement was scheduled to commence on August 13, 2024, and continue until just prior to Thanksgiving on November 21, excluding school breaks during that period. Measurement was to resume on January 13, 2025, and continue until May 22, again except for school breaks. The DOTD Districts involved covered eight parishes: Ascension, East Baton Rouge, Lincoln, Livingston, Ouachita, St. Tammany, Tangipahoa, and West Baton Rouge. Most of these parishes have similar school calendars, so the definition of breaks was generally good for all parishes. After several iterations, the final schedule shown in Table 3 was developed. This included 38 measurement sites, rather than the original 36, because two additional boil shop locations were added at the request of the PRC. Table 3 also shows the scheduling of the pre-test and pilot tests in April through August. The final schedule incorporated several changes due to weather events and equipment issues, as explained in Task 4 of this report.

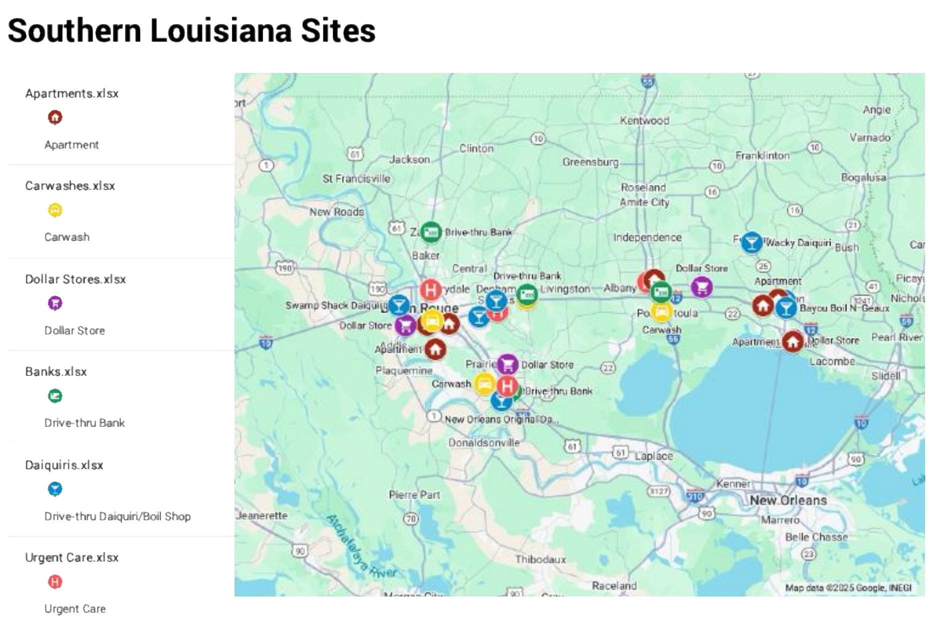
Table 3. Final schedule of measurement

Site #	Week	Installation Date	Deinstallation Date	District	Days	Name	Address	# Entrances
	Pre-Test	4/8/2024	4/11/2024	61		The Crescent at University Lake	Stanford Road, Baton Rouge	1
	Micro-Radar			62		The Grande Apartments	2400 N Morrison Blvd, Hammond, LA 70401	1
	Tests			62		Big Bad Ben Car Wash	14201 U.S. Hwy 190, Hammond, LA 70401	1
1	Week 1	8/12/2024	8/19/2024	61	Mon-Mon	La Boilers	2741 O'Neal Ln, Baton Rouge, LA 70816	1
2				62		Lake UC	14158 W University Ave, Hammond, LA 70401	1
3	Week 2	8/20/2024	8/27/2024	61	Tues-Tues	Patient Plus UC	5420 Plank Rd, Baton Rouge, LA 70805	2*
4	Week 3	8/28/2024	9/5/2024	5	Weds-Thurs*	Ouachita Valley Federal CU	2400 Louisville Ave, Monroe, LA 71201	2*
5	Week 4	9/6/2024	9/13/2024	5	Fri-Fri	Ashford Place		
6	Week 5	9/16/2024	9/23/2024	5	Mon-Mon	Rocketfast Ruston	1822 Northpointe Ln, Ruston, LA 71270	1
7		9/16/2024	9/23/2024	5		South Star UC	4015 Sterlington Rd, Monroe, LA 71203	2
8	Week 6	9/24/2024	10/1/2024	62	Tues-Tues	Dollar General	1216 LA-59, Mandeville, LA 70448	1
9		9/24/2024	10/1/2024	62		New Orleans Original Daiquiris	2700 N Hwy 190, Covington, LA 70433	2
10	Week 7	10/2/2024	10/9/2024	62	Weds-Weds	Wacky Daiquiri	82004 LA-25, Folsom, LA 70437	2
11		10/2/2024	10/9/2024	61		Tsunami	36494 Hwy 74, Geismar, LA 70734	1
12	Week 8	10/10/2024	10/17/2024	61	Thurs-Thurs	Regions Bank	508 N Airline Hwy, Gonzales, LA 70737	2*
13	Week 9	10/18/2024	10/25/2024	61	Fri-Fri	Indigo Park	11959 Nicholson Dr, Baton Rouge, LA 70810	2*
14	Week 10	10/28/2024	11/4/2024	5	Mon-Mon	Dollar General Sterlington	1000 LA-2, Sterlington, LA 71280	1
15		10/28/2024	11/4/2024	5		Dollar General West Monroe	4540 Whites Ferry Rd, West Monroe, LA 71291	1
16	Week 11	11/6/2024	11/13/2024	61	Weds-Weds	New Orleans Original Daiquiri	1810 Louisiana 30 W, Gonzales, LA 70737	2
17		11/6/2024	11/13/2024	61		Swamp Shack Daiquiri	812 N Lobdell Hwy, Port Allen, LA 70767	1
18	Week 12	11/14/2024	11/21/2024	62	Thurs-Thurs	Acadian Village	71153 LA-21, Covington, LA 70433	1
	Thanksgiving Break 11/25/24 - 12/3/24							
3a	Week 2 a	12/4/2024	12/11/2024	61	Weds-Weds	Patient Plus UC	5420 Plank Rd, Baton Rouge, LA 70805	2*
Christmas/New Year Break 12/12/24 - 1/8/25								
20	Week 13	1/9/2025	1/16/2025	5	Thurs-Thurs	Louisiana National Bank	2001 N Trenton St, Ruston, LA 71270	2*
21	Week 14	1/17/2025	1/24/2025	61	Fri-Fri	Benny's	8370 Siegen Ln, Baton Rouge, LA 70810	1
22				62		Rocky's Premier	14584 W University Ave, Hammond, LA 70401	1
23	Week 15	1/27/2025	2/3/2025	5	Mon-Mon	Park Ridge	1812 W Alabama Ave, Ruston, LA 71270	2*
24	Week 16	2/4/2025	2/11/2025	62	Tues-Tues	Dollar General Robert	23261 U.S. Hwy 190 E, Robert, LA 70455	1
25		2/4/2025	2/11/2025	62		Bayou Boil N Geaux	1512 N Hwy 190, Covington, LA 70433	2
26	Week 17	2/12/2025	2/19/2025	62	Weds-Weds	Hancock Whitney Bank	1010 S Range Ave, Denham Springs, LA 70726	2*
27	Week 18	2/20/2025	2/27/2025	61	Thurs-Thurs	Lake UC	20152 Highland Road, Baton Rouge	1
16a		2/20/2025	2/27/2025	61	Thurs-Thurs	New Orleans Original Daiquiri	1810 Louisiana 30 W, Gonzales, LA 70737	2
Mardi Gras 3/3/25 - 3/7/25								
28	Week 19	3/10/2025	3/17/2025	61	Mon-Mon	Dollar General	4393 LA-1 S, Port Allen, LA 70767	1
29		3/10/2025	3/17/2025	61		Regions Bank	4919 Main St, Zachary, LA 70791	2
30	Week 20	3/18/2025	3/25/2025	62	Tues-Tues	Pelican Pointe	2041 Florida St, Mandeville, LA 70448	2
31		3/18/2025	3/25/2025	62		Brookstone Park	1842 Ochsner Blvd, Covington, LA 70433	1
32	Week 21	3/26/2025	4/2/2025	61	Weds-Weds	Dollar General	16208 LA-44, Prairieville, LA 70769	1
33		3/26/2025	4/2/2025	62		First Guaranty Bank	29815 Walker South Rd, Walker, LA 70785	2
34	Week 22	4/3/2025	4/10/2025	62	Thurs-Thurs	Lake UC DS	8249 Vincent Rd, Denham Springs, LA 70726	1
35		4/3/2025	4/10/2025	62		Ron's Seafood Market	1160 S Range Ave, Denham Springs, LA 70726	2
Spring Break 4/14/25 - 4/21/25								
36	Week 23	4/21/2025	4/28/2025	5	Mon-Mon	Bayou Butts and Booze	600 Thomas Rd, West Monroe, LA 71292	2
37		4/21/2025	4/28/2025	5		Rocketfast West Monroe	2900 Cypress St, West Monroe, LA 71291	1
38	Week 24	4/29/2025	5/6/2025	5	Tues-Tues	Coastal UC	1009 S Service Rd W, Ruston, LA 71270	2
5a	**Week 25**	5/7/2025	5/14/2025	5	Weds-Weds	**Ashford Place**	107 Ashford Dr, West Monroe, LA 71291	2*
18a	**Week 26**	5/15/2025	5/22/2025	61	Thurs-Thurs	**Manchac Lake Apartments**	17950 Airline Highway, Prairieville, LA 70769	2*
	Summer Break 5/22/25 - 8/7/25							

A letter "a" on the site number indicates that the site was scheduled earlier but had to be repeated later. The locations of these sites are shown in Figure 1 and Figure 2.

Figure 1. North Louisiana sites

Figure 2. South Louisiana sites



Task 3: Conduct a Pilot Test of the Technology Alternatives

An initial screening test was completed at the Crescent Apartments in Baton Rouge. This was followed by a pilot test at two sites in Hammond: a car wash and an apartment complex. For the pilot test, three trials were undertaken. The detailed results of these trials and the pre-test are provided in Appendix A.

Several conclusions were drawn from these trials:

1. The first trial showed that the automated camera counts overestimated to a greater extent than the radar and did not provide reasonable results in poor light conditions. Therefore, automated camera devices are best used solely as video recording tools in this experiment, rather than for generating automatic vehicle counts.
2. The micro-radar tended to overestimate vehicle counts, with discrepancies typically within 5% or less. Occasionally, the counts exhibited significantly higher errors, and the reasons for this were not apparent from these tests, except for heavy rain, which appeared to affect only one sensor: counting Zone A in both cases. The other counting zones did not appear to be affected by heavy rain.
3. The oblique positioning trialed at the car wash location showed that, even under non-ideal mounting orientations, reasonably accurate counts may be obtained. However, this may require revising the geometry of the counting zones to provide a greater effective detection length perpendicular to the radar's line of sight.
4. Given the occasional larger discrepancies between the radar and the visual counts, it is necessary to continue performing a sample of visual counts to check the radar counts. Because the plan was to place the radar devices for one week at each measurement site, one morning, one midday, and one afternoon count should be randomly taken from the video for each site. It also became apparent that it would be necessary to check the weather, as heavy rain could interfere with one of the directional counts.
5. Placing the radar across the road from each driveway appeared to be the best location. However, the mounting height was of some concern. For wide roads, such as US 190 at the car wash, the radar should be mounted as high as possible, ideally at least 3.5 meters above the ground. The higher mounting at the car wash significantly improved the accuracy of the counts.

Task 4: Collect Data with the Technology Determined from the Pilot Test

Despite the good results from the pilot tests of the micro-radar devices, a number of problems arose as fieldwork progressed. These included problems with the hardware resulting from frequent installation and deinstallation, software issues that took time to resolve, and measurement issues. There were some sites where phantom vehicles were detected in large numbers making turns into a nonexistent driveway. As a result of these issues, the micro-radar devices were used through Week 12 and then replaced with video counts generated by a computer vision tool developed using the YOLO algorithm. This was also enhanced by the acquisition of power banks that extended the time the video cameras could record, enabling the full week of recording at each site.

Preparation to Measure a Site

For each site, it was necessary to identify potential camera locations and radar device sitings, determine the hours for which data were needed, and identify the time when installation and deinstallation should take place. This was done for each week of measurement. In total, 26 weeks of measurement were expected, as shown in Table 3. A typical site detail plan is included here. The one included is for a week in which two sites were to be measured and assumed the use of the micro-radar device(s) and accompanying video cameras.

Week 6: Dollar General, Mandeville, and New Orleans Original Daiquiris, Covington

Dollar General, Mandeville

The Dollar General on LA 59, Girod Street, in Mandeville is a simple location with a single entrance and exit on LA 59. There is a utility pole almost opposite the entrance/exit on which the micro-radar device could be located, as shown in Figure 3 and indicated in the blue circle. This pole is approximately 35 feet from the center of the driveway. The counting zones are shown in red. Zone A is for entering traffic, and Zone B is for exiting traffic. The video camera should be located on the utility pole shown in a purple circle in Figure 3. The camera should be aimed across the driveway and positioned fairly high so that, as far as possible, large trucks entering the parking lot will not entirely mask exiting cars.

Monitoring for this location should be from 6:30 a.m. until 9:00 p.m. on weekdays only (note: the store is open until 10:00 p.m., but traffic after 9:00 p.m. is not of interest). Monitoring should commence on Tuesday, September 24, at approximately noon and continue until Friday, September 27, at 9:00 p.m., then resume on Monday, October 1, at 6:30 a.m. until approximately noon on Tuesday, October 2.

Figure 3. Detailed view of Dollar General, LA 59, Mandeville

New Orleans Original Daiquiris, Covington

This business is located at 2700 North Highway US 190 in Covington. This location is somewhat challenging. The only utility pole that is usable for the micro-radar device is on the west side of US 190, as shown in Figure 4 by the blue circle. This pole is 232 feet from the entrance driveway and 251 feet from the exit driveway.

The counting zones are shown in red. Zones A and D are for entering vehicles, and Zones B and C are for exiting vehicles. There are no directional markers; therefore, it is assumed that vehicles will enter and exit in both driveways. There is no convenient utility pole for mounting the video camera, so it should be co-located with the micro-radar device. Both devices need to be mounted as high as possible because of the distance from the driveways, and to minimize interruption by large trucks on US 190.

Monitoring times for this location should be from 10:30 a.m. until 9:00 p.m. on weekdays only. Monitoring should commence at approximately noon on Tuesday, September 24, and continue until 9:00 p.m. on Friday, September 27, then resume on Monday, October 1, at 10:30 a.m. and continue until approximately noon on Tuesday. October 2.

Figure 4. Detail of New Orleans Original Daiquiris, North Hwy 190, Covington

Travel Times

These two sites are approximately 15 minutes apart. The travel time from LTRC to Dollar General is approximately 1 hour and 15 minutes. From New Orleans Original Daiquiris, it is approximately 1 hour and 10 minutes back to LTRC. Therefore, departure from LTRC at approximately 8:30 a.m. should allow installation of the first micro-radar device and camera at Dollar General by approximately 10:30 a.m. and installation at the New Orleans Original Daiquiris by approximately 11:30 a.m., with return to LTRC by approximately 1:00 p.m. Similarly, for deinstallation, departure at approximately 11:00 a.m. should permit both devices to be uninstalled and returned to LTRC by approximately 2:00 p.m.

Site details for all sites can be found in Appendix B. Originally, these were prepared assuming that the micro-radar device would be used at all sites. In weeks 8 through 10 and 13 through 26, only video cameras were used. However, the guidance in the site documents was still useful for each of these sites, and amendments were not made to the site detail documents.

Micro-Radar Results

The micro-radar devices were used at 11 sites. These sites, with results of the verification tests, are shown in Table 4. The criterion for acceptability of the counts was that they should be within ±10% of the visual count.

Table 4. Results of verification tests for the micro-radar

Week	Site no.	Land use type	District	Radar entering zones	Accuracy	Radar exiting zones	Accuracy
1	1	Drive-Thru Boil Shop	61	Zone A acceptable	100%	Zone B acceptable for evening, but unacceptable for morning and afternoon	106%
	2	Urgent Care	62	Zone B acceptable for afternoon and evening, but unacceptable for morning	96%	Zone A acceptable	109%
3	4	Drive-Thru Bank	05	Zone A and C acceptable	92-95%	Zone B and D acceptable	98-106%
5	6	Carwash	05	Zone A unacceptable	130%	Zone B acceptable	110%
	7	Urgent Care	05	Zone E and F acceptable	100%	Zone D and A acceptable	100%
6	8	Dollar Store	62	Zone A acceptable	108%	Zone B unacceptable	71%
	9	Drive-Thru Daiquiri Shop	62	Zone A acceptable	100%	Zone B acceptable for morning and afternoon, but unacceptable for evening	86%
7	10	Drive-Thru Daiquiri Shop	62	Zone A acceptable	104%	N/A	N/A
	11	Carwash	61	Zone A unacceptable	118%	Zone B acceptable	97%
11	17	Drive-Thru Daiquiri Shop	61	Zone A unacceptable	115%	Zone B acceptable	98%
12	19	Apartment Complex	62	Zone A acceptable	111%	Zone B unacceptable	223%

Table 4 shows that most of the applications of the micro-radar gave acceptable results, although there were some instances of counts that were too inaccurate to be accepted. In all cases where the entering or exiting counts were not acceptable, the other direction was acceptable. Therefore, it was not necessary to re-measure any of the sites with unacceptable counts in one direction. However, the issues encountered with these devices led to their abandonment and replacement with computer vision tool processing of the videos.

Video Camera with Computer Vision Software Results

As noted above, the technical and practical difficulties with the micro-radar devices led to abandonment of this method of collecting the data and replacement with video cameras with power banks attached. The video recordings were then post-processed using the YOLO computer vision software. This method was used for the remaining 27 sites. Similar to the micro-radar results, these counts were also subject to verification, as shown in Table **5**. In Table **5**, an ‘a’ following a week indicates a repeat of a previously scheduled week during which the measurements failed. Similarly, an ‘a’ following a site number also indicates a repeat of a previously scheduled site where the measurements failed. A total of 38 sites were measured with either the micro-radar or the video. As seen in Table 5, the verification results from the video using the computer vision tool all fell within the ±10% margin of error. Several of the visual counts were repeated, and the identical results were obtained each time, suggesting that the visual counts are a good representation of ground truth. Week 14 had to be rescheduled, because of a significant snowstorm in Louisiana that week. Aside than that, weather events did not significantly affect the measurements.

Table 5. Results of verification tests for the computer vision tool

Week	Site no.	Land use type	District	Computer vision entering accuracy	Computer vision exiting accuracy
2	3a	Urgent Care	61	98%	96%
8	12	Drive-Thru Bank	61	102%	110%
9	13	Apartment Complex	61	104%	102%
10	14	Dollar Store	05	92%	92%
	15	Dollar Store	05	92%	92%
2a	3a	Urgent Care	61	100%, 92%	100%, 91%
13	20	Drive-Thru Bank	05	114%	109%
14	21	Carwash	61	105%	--
	22	Carwash	62	104%	99%
16	24	Dollar Store	62	101%	99%
	25	Drive-Thru Boil Shop	62	100%	100%
17	26	Drive-Thru Bank	62	105%	104%
18	27	Urgent Care	61	109%	108%
	16a	Drive-Thru Daiquiri Shop	61	94%	--
19	28	Dollar Store	61	90%	75%
	29	Drive-Thru Bank	61	--	95%
20	30	Carwash	62	101%	97%
	31	Apartment Complex	62	--	103%
21	32	Dollar Store	61	95%	93%
	33	Drive-Thru Bank	62	102%	113%
22	34	Urgent Care	62	95%	95%
	35	Drive-Thru Boil Shop	62	110%	102%
23	36	Drive-Thru Daiquiri Shop	05	109%	98%
	37	Carwash	05	104%	99%
24	38	Urgent Care	05	105%	76%
25	5a	Apartment Complex	05	99%	100%
26	18a	Apartment Complex	61	100%	100%

The 38 sites comprised six apartment complexes, six drive-thru banks, six dollar stores, six urgent care facilities, six car washes, three drive-thru boil shops, and five drive-thru daiquiri shops. The automated counts were obtained for an average of approximately 11.5 hours for five days, or 57.5 hours. Verification involved visual counts from video footage for six hours for each site, or just over 10.4% of the time of the automated counts.

Task 5: Perform Verification Counts on Approximately 10% of the Automated Counts

The verification counts consisted of two hours taken randomly from each of the morning, afternoon, and evening periods for each site. For the sites where the micro-radar was used, the video cameras provided up to three days of video counts coinciding with the radar counts, so the verification counts were taken from those first three days. Subsequently, when the video cameras were connected to power banks, video footage was available for all five weekdays of the measurement. In these cases, the verification periods were distributed across the five days. For each site, a verification report was then written. A sample of one of these verification reports is provided here. The remaining reports are found in Appendix C.

Week 5 Data Verification Checks:
Rocketfast Car Wash, Ruston, and South Star Urgent Care, Monroe

Rocketfast Car Wash, Ruston

Figure 5 shows the location of the micro-radar for the Rocketfast Car Wash in Ruston, which was mounted at six meters above ground. The radar counted car wash entrances (Zone A) and exits (Zone B). Six hours were chosen for verification counts: two in the morning, two in the afternoon, and two in the evening. Both zones may have counts that are too high because vehicles were seen entering the car wash facility, driving into the vacuum bays, then traveling through exit Zone B and straight ahead to enter the car wash through Zone A. This resulted in some double-counting. This is shown more clearly in Figure 6. A possible path for a vehicle is shown in this figure. Such movements were detected on the video several times.

Figure 5. Location of SMATS radar at Rocketfast Car Wash, Ruston

Two cameras were used to record video for this location. Counts were made from both videos. Most of the counts from the two cameras are identical or differ by only one vehicle. These discrepancies arose partly because of vehicle obstructions at certain times and partly because it is unclear whether the two cameras were fully synchronized.

The radar and visual counts are shown in Table 6. This shows that the visual counts are generally identical or very close, but there are significant differences between the visual and radar counts. To compute the accuracy of the radar counts, because the radar counts were almost invariably higher, the comparison was made against the highest of the two visual counts.

Figure 6. Detailed view of Rocketfast Car Wash, Ruston

Table 6. Comparison of visual and radar counts for Rocketfast Car Wash, Ruston

Location height 6 m		SMATS radar counts		Visual counts			
				Camera 1		Camera 2	
Time and date		Zone A (In)	Zone B (Out)	In	Out	In	Out
9/17/2024	8:00 to 8:15	16	15	13	11	13	12
	8:15 to 8:30	7	8	2	4	2	4
	8:30 to 8:45	12	3	8	5	8	5
	8:45 to 9:00	12	10	9	8	9	8
	9:00 to 9:15	5	9	8	10	8	11
	9:15 to 9:30	13	9	8	9	8	9
	9:30 to 9:45	7	9	6	8	5	8
	9:45 to 10:00	7	10	5	6	4	6
	Total	**79**	**73**	**54**	**60**	**57**	**63**
	Accuracy %	**138.5**	**115.9**				
9/17/2024	13:00 to 13:15	13	15	9	16	9	15
	13:15 to 13:30	15	12	14	8	14	8
	13:30 to 13:45	17	12	14	10	14	10
	13:45 to 14:00	14	14	10	14	10	14
	14:00 to 14:15	11	15	9	10	9	11
	14:15 to 14:30	7	8	8	9	9	8
	14:30 to 14:45	17	8	11	9	10	8
	14:45 to 15:00	11	15	7	9	7	8
	Total	**105**	**99**	**82**	**85**	**82**	**82**
	Accuracy %	**128**	**116.5**				
9/18/2024	16:00 to 16:15	9	15	11	9	10	9
	16:15 to 16:30	22	13	15	17	14	18
	16:30 to 16:45	11	6	11	6	11	6
	16:45 to 17:00	21	14	14	12	14	13
	17:00 to 17:15	9	19	5	12	5	12
	17:15 to 17:30	14	8	10	11	10	12
	17:30 to 17:45	14	5	17	5	17	6
	17:45 to 18:00	27	12	15	16	15	16
	Total	**127**	**92**	**98**	**88**	**93**	**92**
	Accuracy %	**129.6**	**100**				

From Table 6, the entrance counts are not very accurate, generally ranging from 128 to 138% and always overcounting. The exit counts, on the other hand, are much closer, ranging from 116.5 to 100% accurate. The reasons for overcounting are at least in part due to the situation shown in Figure 6.

South Star Urgent Care, Monroe

Figure 7 shows the location of the SMATS radar and six counting zones for South Star Urgent Care in Monroe. The SMATS radar was mounted three meters above ground on a utility pole. The radar counted entrances at Zones B, C, E, and F and exits at Zones A and D. Six hours were again chosen for verification checks: two in the morning, two in the afternoon, and two in the evening. There were two video cameras mounted at this location, one to the south of the facility and one to the north. The north camera ran out of battery power in the early afternoon of September 19, so only the south camera was used for the final set of verification checks. However, the counts from the video cameras were identical for almost all four hours used prior to September 19, so there is no loss from the absence of video from that camera.

Table 7 shows the verification counts for the South Star Urgent Care radar device. The micro-radar counts should be identical for Zones C and F, and identical for Zones B and E. For Zones C and F, there are three 15-minute periods (out of 24) in which the counts differ. Two of these differ by one vehicle, and one differs by two. For Zones B and E, there are two 15-minute periods that differ by one vehicle.

Figure 7. Counting zones for South Star Urgent Care, Monroe

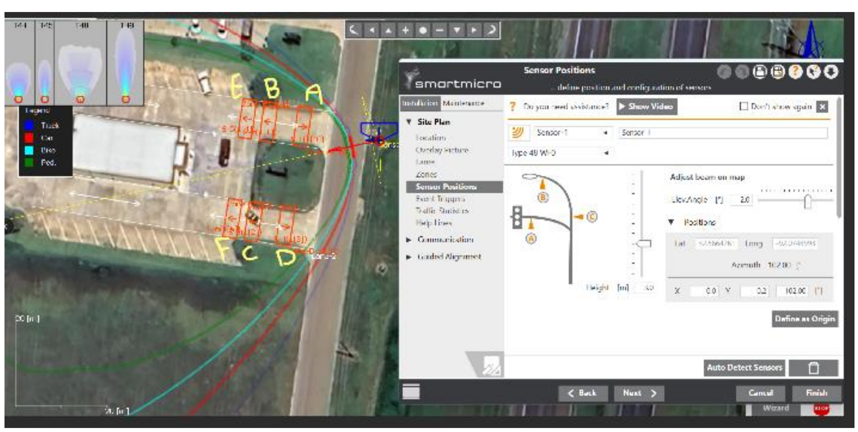


Table 7. Comparison of radar and visual counts for South Star Urgent Care, Monroe

Date/time	Radar						Video counts							
	In (South)		In (North)		Out (South)	Out (North)	Camera 1 (North)				Camera 2 (South)			
	Zone C	Zone F	Zone B	Zone E	Zone D	Zone A	In (South)	In (North)	Out (South)	Out (North)	In (South)	In (North)	Out (South)	Out (North)
9/17/2024														
10:00	0	0	0	1	0	1	1	0	0	1	1	0	0	1
10:15	0	1	4	4	4	1	0	2	2	1	1	2	3	1
10:30	0	0	0	0	0	1	0	0	0	1	0	0	0	1
10:45	1	1	1	2	1	0	2	1	2	0	2	1	2	0
11:00	1	1	0	0	1	0	0	0	0	0	0	0	0	0
11:15	0	0	1	1	0	0	0	2	0	0	0	2	0	0
11:30	0	0	1	1	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	3	1	0	0	3	1	0
Total	**2**	**3**	**7**	**9**	**6**	**3**	**3**	**8**	**5**	**3**	**4**	**8**	**6**	**3**
Difference	**-2**	**-1**	**-1**	**+1**	**0**	**0**								
9/18/2024														
12:00	1	1	1	1	2	0	1	1	1	0	1	1	1	0
12:15	0	0	0	0	1	0	0	0	1	0	0	0	1	0
12:30	0	0	0	0	1	0	0	0	1	0	0	0	1	0
12:45	1	1	1	1	2	0	1	1	2	0	1	1	2	0
13:00	1	1	0	0	1	0	1	0	1	0	1	0	1	0
13:15	0	0	1	1	0	0	0	1	0	0	0	1	0	0
13:30	0	0	3	2	0	0	0	2	0	0	0	2	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**3**	**3**	**6**	**5**	**7**	**0**	**3**	**5**	**6**	**0**	**3**	**5**	**6**	**0**
Difference	**0**	**0**	**+1**	**0**	**+1**	**0**								
9/19/2024														
16:00	1	0	0	0	2	0					1	0	2	0
16:15	0	0	0	0	0	1					0	0	0	0
16:30	0	0	1	1	1	0					0	1	1	0
16:45	0	1	2	2	0	1					1	2	0	1
17:00	0	0	0	0	0	0					0	0	0	0
17:15	0	0	1	1	2	0					0	1	2	0
17:30	0	0	0	0	0	1					2	0	2	1
17:45	1	3	1	1	2	0					0	0	0	1
Total	**2**	**4**	**5**	**5**	**7**	**3**					**4**	**4**	**7**	**3**
Difference	**-2**	**0**	**+1**	**+1**	**0**	**0**								

Numerical differences are discussed because the numbers of vehicles entering and exiting the facility are so small. Looking first at vehicles entering the south driveway, Zone C undercounted by one vehicle in the first two-hour period. The counts from the two video cameras also differed by one and were both higher than the radar. In the second test period, the radar agreed with the video counts exactly. In the third period, the radar undercounted by two vehicles. For Zone F, the radar agreed with the video counts from the north camera and differed from the south camera by one vehicle in the morning test period.

For Zone B, the radar undercounted by one vehicle during the morning test period relative to both camera counts. The radar overcounted by one vehicle in the afternoon period and overcounted by one in the evening period. For Zone E, the radar overcounted by one vehicle in both the morning and the evening periods and agreed exactly in the afternoon.

For the outbound traffic, the radar for Zone D agreed with the south camera in the morning (the north camera gave a count of one fewer vehicle), overcounted by one vehicle for the afternoon period (the two video counts agreed with each other), and agreed exactly for the evening period. For Zone A, the radar was in exact agreement with the video counts for all three periods.

The 15-minute intervals in which no vehicles were detected by the radar or the video counts are generally in agreement. Overall, the radar detection was accurate for this facility, although Zones E and F showed slightly higher accuracy for entering vehicles than Zones B and C. Also, with such low numbers of vehicle detections, a small discrepancy in the time synchronization between the two video cameras and the radar could account for several of the differences in counts. It was noted while making the counts from the video recordings that a vehicle was often counted entering or exiting the facility within a few seconds of the beginning or ending of the 15-minute time period, and it was not possible to determine from the position of the video cameras exactly when an exiting or entering vehicle actually passed through the counting zone.

Task 6: Clean the Data

Two activities were completed to clean and prepare the data. First, the data for each site were examined to determine if there were missing hours, after combining the hours of the first and last days. There were 15 instances in which three hours were missing, most of which occurred on Mondays, with a small number distributed across other weekdays. There were 12 instances with six hours missing, and six instances with nine hours missing. For sites with three hours missing, the procedure was to use hot-deck imputation to replace the missing values.

In this procedure, the time-of-day period corresponding to the missing data is first identified. The observations for that period are then divided into those with complete and incomplete data. For the purposes of this exercise, data are aggregated to hourly counts. The data of the complete days are randomly ordered. Then, for the first missing hour, the first randomly ordered complete observation for that hour is used to replace the missing value. This is repeated for the second and third missing hours.

For those sites with more than three missing hours, it is somewhat more questionable to use any form of imputation. However, if the six or nine hours fall across different time periods of the day, hot-deck imputation can be performed using the method described. However, if all of the missing hours fall in the same time period, this will substantially reduce the number of observations available as ‘donors’ to the missing values. In those cases, the period was removed from the valid data.

The second data-cleaning activity was to compute adjustment factors for the automated counts by using the inverse of the percentage accuracy of the counts. These data cleaning activities were performed prior to further analysis for each site.

Task 7: Analyze the Data to Provide Trip Rates and Compare to ITE Trip Rates

This task was performed on a land use type-specific basis. For each land use type, the data from six sites (eight sites for the drive-thru boil/daiquiri shops) were analyzed in relation to the first four research objectives. Trip counts were standardized as vehicle trips per weekday per 1,000 square feet of gross floor area (GFA), enabling direct comparison across sites and with ITE rates. All rates discussed in this section, unless specifically stated otherwise, are trip rates per weekday per 1,000 square feet GFA. The exception to this is apartment complexes, where the rates are trip rates per weekday per unit. Also, at each site, trip counts were observed for five weekdays within seven consecutive days. The exception was a few sites where data were missing for a day or two due to device battery problems. In these instances, trip counts were gathered from other weeks on the same missing weekdays. For all land use types, sites were selected to capture variability in contextual factors to examine their potential influence on trip rates. The contextual factors influencing trip rates across all land use types are AADT, population density, and jobs per worker. Each factor is classified as either high or low to facilitate comparison.

The area of each site was measured using Google Earth. All sites except the apartment complexes were single-story buildings, so the footprint is a measure of the area of the land use. In the case of apartment complexes, the criterion variable is not GFA, but the number of units, which was found via an internet search.

As noted in Task 5, accuracy was determined from six hours of counts, in which automated counts were compared with visual counts from video records. In a few cases, fewer than six hours could be checked. For each site, the accuracy is reported in the following subsections. Regarding Objectives 1 and 2 of this study, the Coefficient of Variation (CV) is reported both across weekdays within a site and across sites within a weekday for all sites. As a rule, a CV of 10% or less indicates low variability, a value between 10 and 30% indicates moderate variability, and a value greater than 30% indicates high variability [34]. If the CV is high across weekdays within a site, this suggests that variability across weekdays is important and that sites should be measured daily. If the CV is high across sites within a day of the week, it suggests that site characteristics likely need to be taken into account when estimating trip rates. Regarding Objectives 3 and 4 of this study, the variability is examined further by estimating LMMs for each land use type. These models are not intended as predictive models of trip rates, but rather as exploratory models to reveal the importance of different site attributes in determining trip rates, which the ITE trip rates do not account for.

Based on the collected data, trip rates were observed and calculated for both the morning and evening peak hours of the adjacent roadway and the trip generator. The morning and evening peak hours for each site were obtained from the Traffic Count Database System (TCDS) on the DOTD website via the MS2 platform. ITE defines the morning peak hour as 7:00 a.m. to 9:00 a.m., and the evening peak hour as 4:00 p.m. to 6:00 p.m. When the morning or evening peak hour extracted from MS2 for a given site did not fall within the ITE-defined time ranges, the highest one-hour volume within the applicable ITE range was identified to facilitate comparison with ITE trip rates.

It is also noted that, while trip rates have been updated to reflect those provided in the 12th Edition of the ITE Trip Generation Manual [1], if the rates primarily depend on data collected before 2020, then the data do not include changes that may have arisen as a result of the COVID-19 pandemic. This is likely to result in some significant differences in trip rates.

Dollar Store Sites

Introduction

Six dollar store locations were selected. Table 8 presents information for the six sites, along with the accuracy of entering and exiting counts at each site and the adjustment factors applied to the trip counts. The accuracy of the entering counts was higher than that of the exiting counts, so the analysis was conducted using the entering values. To compare observed trip rates with ITE trip rates, the rates were used from ITE Land Use 815–Free-Standing Discount Store; see Figure 8. The sites were surveyed in the 1990s, 2000s, and 2010s in California, Connecticut, Delaware, Florida, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Oregon, Pennsylvania, South Dakota, and Wisconsin.

Table 8. Site details and accuracy of entering and exiting trip counts for the six dollar store sites

Week	Site no.	Name	District	Area (sq. ft.)	Data collection	Entering accuracy	Exiting accuracy	Adjustment factor	Monitoring time
21	32 (A)	Dollar General, Prairieville	61	8,829	YOLO	95%	93%	1.05	7:30 a.m. until 8:30 p.m.
19	28 (B)	Dollar General, Port Allen	61	9,447	YOLO	90%	75%	1.11	7:45 a.m. until 8:30 p.m.
6	8 (C)	Dollar General, Mandeville	62	10,193	Micro-Radar	108%	71%	0.93	6:30 a.m. until 9 p.m.
16	24 (D)	Dollar General, Robert	62	10,716	YOLO	101%	99%	0.99	7:30 a.m. to 8:30 p.m.
10	15 (E)	Dollar General West Monroe	05	8,800	YOLO	92%	92%	1.09	6:30 a.m. to 8:30 p.m.
10	14 (F)	Dollar General, Sterlington	05	8,505	YOLO	92%	92%	1.09	7:30 a.m. until 8:30 p.m.

Table 9 presents the daily vehicle trip counts for the six dollar store sites across the five weekdays. At the daily trip rate level, variation across the five weekdays at each site ranged from 5.8 to 8.8%, indicating low variability in daily rates. The CVs across sites on weekdays show moderate variability, ranging from 15% to 27%.

Figure 8. ITE Land Use 815–Free-Standing Discount Store

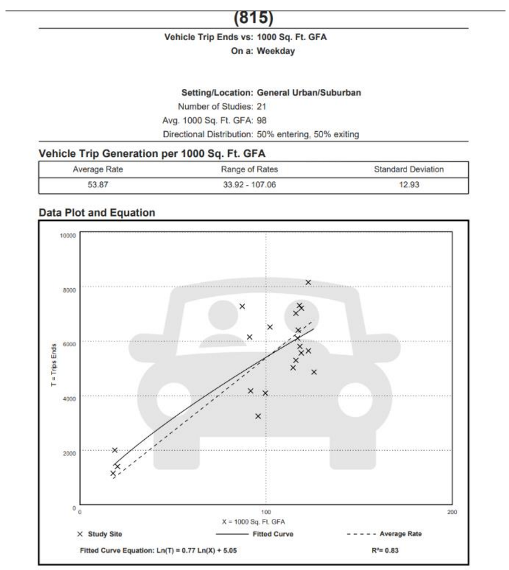


Table 9. Daily vehicle trip rates and statistics for the dollar store sites

Daily Trips per 1,000 sq. ft. GFA												
Statistic	**District 61**		**District 62**		**District 5**		**Mean**	**Maximum**	**Minimum**	**Variance**	**Standard deviation**	***Coeff. of variation %***
	Site A	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**						
Tuesday (1)	28.9	31.0	51.4	36.8	…..*	…..*	37.0	51.4	28.9	102.6	10.1	***27.4***
Wednesday (2)	32.1	32.3	46.9	34.3	36.4	40.6	37.1	46.9	32.1	32.9	5.7	***15.5***
Thursday (3)	29.3	27.9	42.1	30.4	36.3	33.7	33.3	42.1	27.9	28.1	5.3	***15.9***
Friday (4)	29.7	28.7	46.5	34.4	40.5	37.3	36.2	46.5	28.7	45.7	6.8	***18.7***
Monday (5)	33.8	34.6	48.1	35.8	35.9	34.9	37.2	48.1	33.8	29.3	5.4	***14.6***
Mean	30.8	30.9	47.0	34.3	37.3	36.6	36.1			35.9	6.0	***16.6***
Maximum	33.8	34.6	51.4	36.8	40.5	40.6						
Minimum	28.9	27.9	42.1	30.4	35.9	33.7						
Variance	4.4	7.4	11.2	5.9	4.7	9.4	2.8					
Standard Deviation	2.1	2.7	3.4	2.4	2.2	3.1	1.7					
Coeff. of Variation %	***6.8***	***8.8***	***7.1***	***7.1***	***5.8***	***8.4***	***4.6***					

…..*: More than 3 hours of data missing

Table 10 shows weekday average trip rates for the dollar stores compared to ITE rates. It can be seen that all sites have trip generation rates above the ITE average of 26.94.

Table 10. Trip rates for the dollar store sites compared to ITE rates

	Site A	*Site B*	*Site C*	*Site D*	*Site E*	*Site F*
Estimated rate per 1,000 sq. ft. GFA "Weekday Average"	30.8	30.9	47.0	34.3	37.3	36.6
ITE trip rate per 1,000 sq. ft. GFA	26.94	26.94	26.94	26.94	26.94	26.94

Table 11 summarizes the contextual factors associated with each site, including AADT, population density, and jobs per worker, and categorizes them as "High" or "Low" based on average values across multiple sites.

Table 11. Contextual factor levels for dollar store sites in Districts 61, 62, and 05

Sites	AADT levels	Population density level	Jobs/worker level
Site A	Low	High	Low
Site B	High	Low	Low
Site C	High	High	Low
Site D	Low	Low	Low
Site E	Low	Low	High
Site F	Low	Low	Low

The district-level analyses presented here aim to identify patterns specific to regional contexts, while the LMM results evaluate how contextual factors affect trip rates across all dollar store sites combined.

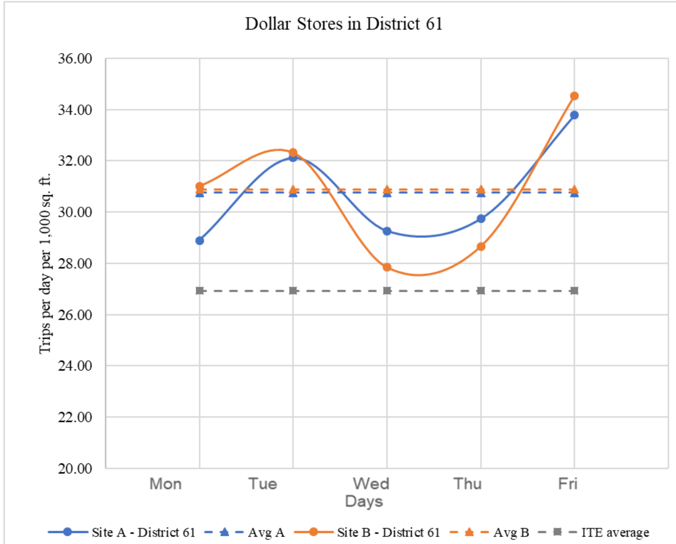
District 61

Table 9 shows that in District 61, Site A recorded daily trip rates ranging from 28.9 on Tuesday to 33.8 on Friday, with an average of 30.8. Site B showed slightly lower daily rates, ranging from 27.9 on Thursday to 34.6 on Monday, with an average of 30.9. The trip rates of both sites are slightly higher than the corresponding ITE daily trip rate of 26.94. From Table 11, Site A has a low AADT level but a high population density level, while Site B has a high AADT level but a low population density level. These data are also illustrated in Figure 9, highlighting the similarity in trip rates between the two sites despite their differing contexts. The inverse relationship of AADT and population density suggests a possible balancing effect between these two factors, which may contribute to the similar trip rate outcomes observed between the two locations. The observed trip rates at both Sites A and B are consistently higher than the ITE value across all weekdays. This difference suggests that the ITE trip rates underestimate trip volumes for dollar stores in this region.

District 62

In District 62, daily vehicle trip rates were collected from two dollar store sites: Site C and Site D. Table 9 shows that Site C recorded the highest average daily trip rate of 47.0, with values ranging from 42.1 to 51.4. In contrast, Site D recorded a lower average of 34.3, with values ranging from 30.4 to 36.8. Both sites showed relatively consistent weekday trends. The contextual factors shown in Table 11 show that Site C is located in an area with high AADT and high population density, while Site D is situated in an area with low AADT and population density. Both sites have a low jobs per worker level. These contextual differences are visually reflected in Figure 10, which highlights the difference in rates between the two sites. Both sites in District 62 exhibited similar day-to-day trip patterns, and the observed trip rates at Site C and Site D are considerably higher than the ITE estimates, with a mean of approximately 47.0 and 34.3, respectively, compared to the ITE value of 26.94. These results demonstrate that even within the same district, trip rates can vary across sites, underscoring the need to incorporate local contextual variables when estimating trip rates rather than using standardized rates.

Figure 9. Daily vehicle trip counts for dollar store sites in District 61



District 05

In District 05, weekday trip counts were collected from two dollar store sites: Sites E and F. Table 9 shows that Site E recorded an average trip rate of 37.3, with daily counts ranging from 36.0 to 40.5. Site F reported a comparable average of 36.6, ranging from 33.7 to 40.6. Both sites exhibited similar weekday patterns, and their trip rates were well above the ITE rate of 29.94. The contextual factors in Table 11 indicate that both sites are in areas with low AADT and population density. However, Site E had a higher job to worker ratio than Site F. Despite this difference, the daily trip rates are similar. These relationships are illustrated in Figure 11, which compares the daily trip rates of both sites alongside the ITE benchmark. These results suggest that the ITE rates may underestimate trip rates for these locations. A possible reason for the difference could be local site characteristics that the ITE manual does not capture. The similarity in trip rates despite the difference in jobs per worker level emphasizes the significant influence of AADT and population density in shaping trip rates at these sites.

Figure 10. Daily vehicle trip rates for dollar store sites in District 62

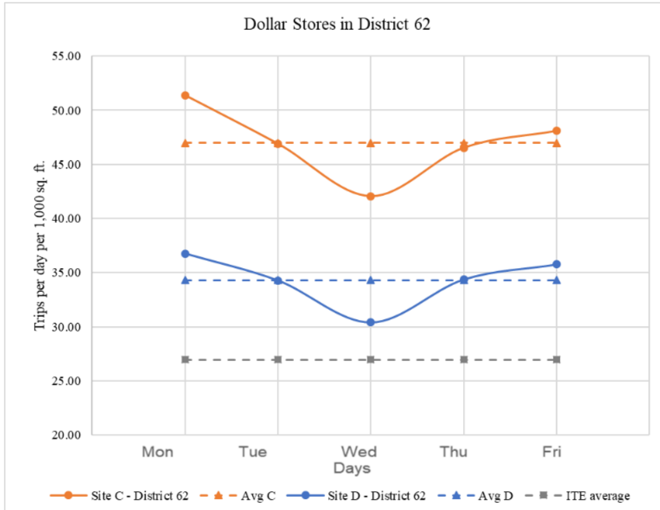


Figure 11. Daily vehicle trip rates for dollar store sites in District 05

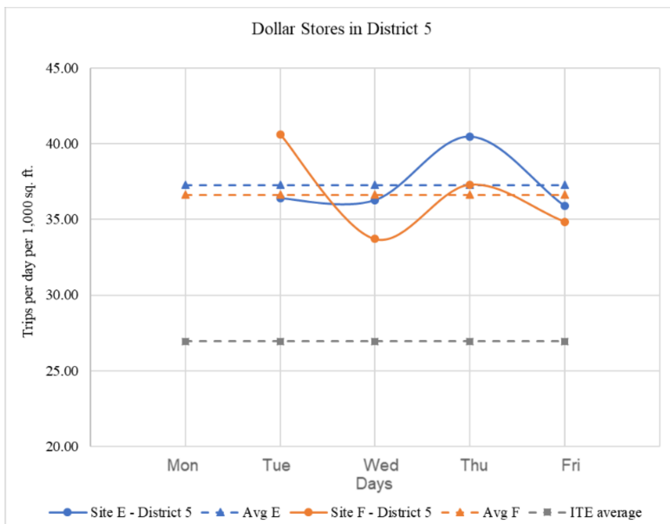


Table 12 presents the LMM that was developed to estimate the effects of the contextual variables and nested data structures across districts and weekdays. The intercept of 61.1 represents the approximate expected trip count for a site located in a high AADT, high population density, and high jobs per worker tract on an average weekday. Both AADT and population density had statistically significant effects on the trip rates. Sites located adjacent to a road with low AADT could be expected to generate approximately 25% fewer daily trips compared to sites located adjacent to a road with high AADT, while those in low population density areas could be expected to generate approximately 28% fewer daily trips. The jobs per worker level did not have a statistically significant impact ($p = 0.206$). Including weekday as a random effect captured temporal variability across districts. The variance component for weekdays was relatively high (121), affirming the importance of accounting for temporal fluctuations. Overall, these results support that AADT and population density are critical contextual factors influencing dollar store traffic, while jobs per worker is not.

Table 12. Linear mixed model results for dollar store sites

Predictor	Coef. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	61.13	3.31	18.48	<0.001	[53.80, 66.61]
x_i	−16.15	0.88	-18.39	<0.001	[-17.89, -14.41]
z_i	-17.35	1.25	-13.86	<0.001	[-19.82, -14.86]
y_i	-1.09	0.87	-1.26	0.206	[-2.79, 0.60]
Weekday Var	121.06				
No. of observations (Days): 30					
No. of groups (Localities): 3					
$R^2 = 0.98$ • x_i is the indicator variable with constant value 1 if AADT level at the ith site is low and 0 otherwise • z_i is the indicator variable with constant value 1 if population density level at the ith site is low and 0 otherwise • y_i is the indicator variable with constant value 1 if jobs per worker level at the ith site is low and 0 otherwise					

Analysis of Peak Hour Trip Rates

Table 13 presents the details for each dollar store site, including the reported morning and evening peak hours from MS2 and the highest one-hour volume within the ITE-defined peak hour periods.

Table 13. Morning and evening peak hours from MS2 and the highest one-hour volumes within ITE-defined ranges for dollar store sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume (07:00-09:00)	Highest one-hour volume (16:00-18:00)
A	Dollar General, Prairieville	16208 LA-44, Prairieville, LA 70769	Wed 11/4/2020	07:00-08:00	16:00-17:00	07:00-08:00	16:00-17:00
B	Dollar General, Port Allen	4393 LA-1 S, Port Allen, LA 70767	Tue 2/11/2025	04:30-05:30	16:30-17:30	07:00-08:00	16:30-17:30
C	Dollar General, Mandeville	1216 LA-59, Mandeville, LA 70448	Thu 7/28/2022	10:30-11:30	14:30-15:30	08:00-09:00	16:00-17:00
D	Dollar General, Robert	23261 U.S. Hwy 190 E, Robert, LA 70455	Tue 1/28/2025	07:15-08:15	14:30-15:30	07:15-08:15	16:00-17:00
E	Dollar General, West Monroe	4540 Whites Ferry Rd, W. Monroe, LA 71291	Tue 6/3/2025	07:15-08:15	16:45-17:45	07:15-08:15	16:45-17:45
F	Dollar General, Sterlington	1000 LA-2, Sterlington, LA 71280	Wed 1/8/2025	07:00-08:00	16:15-17:15	07:00-08:00	16:15-17:15

Table 14 shows that the estimated peak hour trip rates for the dollar store sites fall within the range of the ITE hourly trip rates, except for Site C for the weekday morning peak hour, which is above the maximum. At Sites A and B, two of the rates are lower than the corresponding ITE average rates, and at Sites C, D, E and F, the rates are higher than the ITE average. Overall, the sites tend to be higher than the ITE averages, but less than the ITE maximum.

Table 14. Comparison between the peak hour trip rates for the dollar store sites and the corresponding ITE rates

Time period	Estimated rate per 1,000 sq. ft. Gross Floor Area (GFA)						ITE Trip Rate per 1,000 sq. ft. of GFA (12th Edition)		
	Site A	Site B	Site C	Site D	Site E	Site F	Average	Minimum	Maximum
Weekday morning peak hour	0.7	0.8	2.5	1.6	1.1	1.8	0.8	0.4	1.8
Weekday morning peak hour of generator	2.1	1.6	3.8	2.8	3.4	2.7	2.6	1.5	4.9
Weekday evening peak hour	3.2	4.2	4.2	4.3	5.1	4.7	2.4	0.8	5.1
Weekday evening peak hour of generator	4.1	4.8	5.2	4.4	5.3	5.2	2.6	1.6	6.1

Urgent Care Sites

Introduction

Six urgent care sites were selected for field data collection of trip rates, two from each of the three Districts. Table 15 presents information on the sites, along with the accuracy of entering and exiting counts at each of the six sites.

Table 15. Site details and accuracy of entering and exiting trip counts for the six urgent care sites

Week	Site no.	Name	District	Area (sq. ft.)	Data collection	Entering accuracy	Exiting accuracy	Adjustment factor	Monitoring time
2	3 (A)	Patient Plus UC, Baton Rouge	61	3773	YOLO	98%	96%	1.02	8:30 a.m. to 9:30 p.m.
18	27 (B)	Lake UC, Baton Rouge	61	3310	YOLO	109%	108%	0.93	7:30 a.m. to 6:30 p.m.
1	2 (C)	Lake UC, Hammond	62	3140	Micro-Radar	80%	109%	0.92	7:30 a.m. to 8:30 p.m.
22	34 (D)	Lake UC, Denham Springs	62	3498	YOLO	95%	95%	1.05	7:45 a.m. to 8:15 p.m.
5	7 (E)	South Star, Monroe	05	3116	Micro-Radar	100%	100%	1.00	7:30 a.m. to 8:30 p.m.
24	38 (F)	Coastal, Ruston	05	3057	YOLO	105%	76%	0.95	7:30 a.m. to 8:30 p.m.

To compare the observed trip rates of those sites with the ITE trip rates, ITE Land Use 630—Clinic was used; see Figure 12 and Figure 13. The sites were surveyed in the 1990s, 2000s, and 2010s in California, Minnesota, Texas, Vermont, and West Virginia. Based on the operational characteristics of the selected urgent care sites, ITE Land Use Code 630—Clinic is the most appropriate classification. The urgent care facilities operate daily from 7:30 a.m. to 9:30 p.m. These facilities do not provide 24/7 emergency care or handle life-threatening conditions, which aligns with the ITE definition of a clinic.

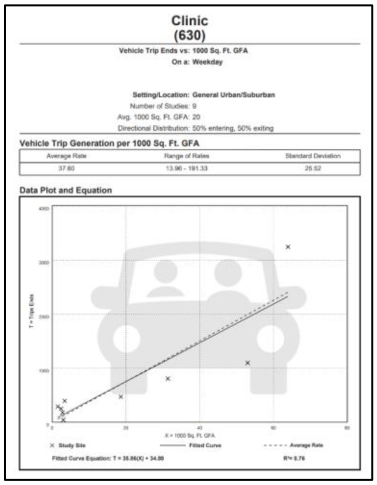
Figure 12. ITE Land Use 630—Clinic Description

Land Use: 630
Clinic

Description

A clinic is a facility that provides limited diagnostic and outpatient care but is unable to provide prolonged in-house medical and surgical care. A clinic may have a lab facility and supporting pharmacy but typically does not have the equipment and medical personnel available at an urgent care site. A clinic typically offers a wide range of services which makes it distinct from a medical office building that typically houses specialized or individual physicians. Hospital (Land Use 610), free-standing emergency room (Land Use 650), and medical-dental office building (Land Use 720) are related uses.

Figure 13. ITE Land Use 630—Clinic Vehicle Trip Generation Rate



Clinic
(630)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 9
Avg. 1000 Sq. Ft. GFA: 20
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
37.60	13.96 - 191.33	25.52

Data Plot and Equation

Analysis and Results

Table 16 presents the daily vehicle trip rates for the six urgent care sites across the five weekdays. The daily trip rates showed moderate variability across weekdays, with the variation across days ranging from 10 to 24%, and moderate to high variability across sites, ranging from 21 to 38%.

Table 16. Daily vehicle trip rates and statistics for the urgent care sites

Daily Trips per 1,000 sq. ft.	District 61		District 62		District 05		Mean	Maximum	Minimum	Variance	Standard deviation	*Coeff. of variation (CV) %*
	Site A	Site B	Site C	Site D	Site E	Site F						
Monday	23.8	10.9	19.9	12.6	15.7	…*	16.6	23.8	10.9	27.8	5.3	***31.8***
Tuesday	23.0	9.5	27.8	11.1	17.7	21.8	18.5	27.8	9.5	50.5	7.1	***38.5***
Wednesday	27.9	12.9	19.6	12.0	20.9	20.2	18.9	27.9	12.0	34.0	5.8	***30.8***
Thursday	27.6	14.3	17.8	14.7	18.6	17.1	18.4	27.6	14.3	23.4	4.8	***26.3***
Friday	21.4	13.7	14.6	12.6	19.3	19.0	16.8	21.4	12.6	12.7	3.6	***21.2***
Mean	24.7	12.3	19.9	12.6	18.4	19.6	17.9			22.6	4.8	***26.6***
Maximum	27.9	14.3	27.8	14.7	20.9	21.8						
Minimum	21.4	9.5	14.6	11.1	15.7	17.1						
Variance	8.3	4.0	23.5	1.8	3.6	3.9	1.1					
Standard Deviation	2.9	2.0	4.9	1.3	1.9	2.0	1.1					
Coeff. of Variation (CV) %	***11.6***	***16.3***	***24.3***	***10.5***	***10.4***	***10.1***	***6.0***					

… Approximately 9 hours were missed; the day count has been excluded.*

Site A recorded the highest daily trip rates, peaking at 27.9 on Wednesday and averaging 24.7 over the observed period. In contrast, Site B exhibited the lowest mean trip rate at 12.3, with a minimum value of 9.5 on Tuesday. Site D demonstrated the least variability in trip rates, with a standard deviation of only 1.3 and a CV of 10.5%, while Site C showed the highest variability (CV = 24.3%), indicating a moderate variability in daily demand. The average daily trip rate across all sites and weekdays was 17.9, with a maximum of 27.9 at Site A on Wednesday and a minimum of 9.5 at Site B on Wednesday. This variability indicates that site-specific and temporal factors significantly influence trip rates.

Table 17 shows the trip rates for the urgent care facilities compared to ITE rates. It can be seen that two sites (Sites B and D) have trip generation rates that are well below the ITE average rate of 18.80, three sites (Sites C, E, and F) are very close to ITE average rates, and one site (Site A) has a trip generation rate that is significantly above the ITE average rate. All sites are above the minimum ITE rate.

Table 17. Trip rates for the urgent care sites compared to ITE rates

	Site A	*Site B*	*Site C*	*Site D*	*Site E*	*Site F*
Estimated Rate per 1,000 sq. ft. GFA "Weekday Average"	24.7	12.3	19.9	12.6	18.4	19.6
ITE average Trip Rate per 1,000 sq. ft. GFA	18.80	18.80	18.80	18.80	18.80	18.80
ITE min Trip Rate per 1,000 sq. ft. GFA	6.98	6.98	6.98	6.98	6.98	6.98
ITE max Trip Rate per 1,000 sq. ft. GFA	95.67	95.67	95.67	95.67	95.67	95.67

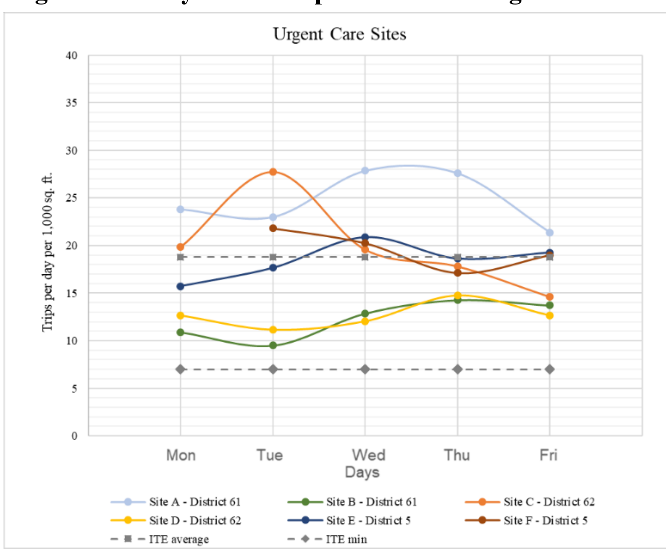
The contextual factors that may influence trip rates across the six study sites are summarized in Table 18.

Table 18. Contextual factor levels for the urgent care sites

Sites	AADT level	Population density level	Jobs per worker level
Site A	High	Low	High
Site B	Low	High	High
Site C	Low	Low	High
Site D	High	High	Low
Site E	High	Low	Low
Site F	Low	Low	Low

The data are also illustrated in Figure 14, which presents the daily vehicle trip rates for the six urgent care sites compared to the ITE average trip rate and the ITE minimum rate. Unlike the dollar store sites, no clear pattern is observed across the urgent care sites, making it unsuitable to group them by DOTD District. This lack of a pattern is expected, because trips to urgent care facilities are typically unplanned and do not follow regular behavioral patterns. Considering the moderate coefficients of variation, the data support analyzing each site individually. However, to make the figures less confusing, the sites are discussed below by District.

Figure 14. Daily vehicle trip rates for the urgent care sites



Site A shows a relatively high and variable trip rate throughout the week, peaking on Wednesday at 27.9 trips; see Figure 15. The lowest rate of 21.4 is on Friday. This site consistently stays well above the ITE average rate (18.80) but remains below the ITE maximum (95.67). The weekday average for Site A is 24.7, which is 32% higher than the ITE average. Figure 15 shows that Site B has the lowest trip rates across all five weekdays. It starts at approximately 10.9 on Monday, decreases slightly to 9.5 on Tuesday, then gradually increases, never surpassing 15. Its weekday average is 12.3, which is above the ITE minimum and about 35% lower than the ITE average.

Figure 15. Daily vehicle trip rates for the urgent care sites in District 61

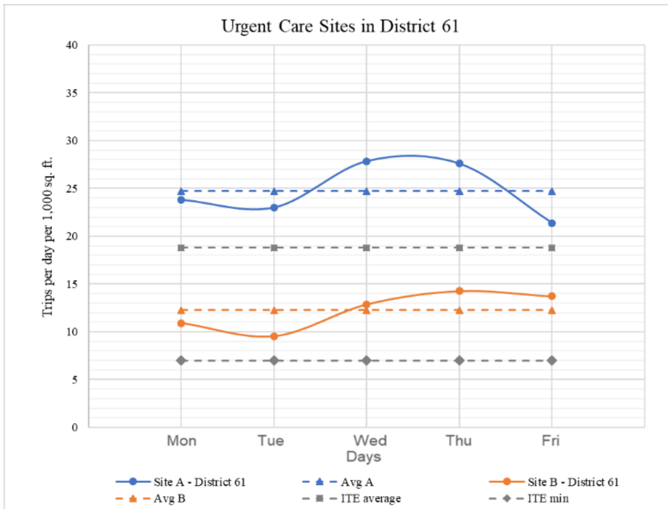


Figure 16 shows that Site C exhibits moderate to high fluctuation, with the highest rate of approximately 27.8 on Tuesday, then decreasing toward Friday. Its weekday average is 19.9, which is approximately 6% higher than the ITE average. Site D reports near-lowest trip rates throughout the week, with values ranging from 11 to 15. Its weekday average is 12.6, making it 33% lower than the ITE average, making it one of the least active urgent care sites in the sample.

Figure 16. Daily vehicle trip rates for the urgent care sites in District 62

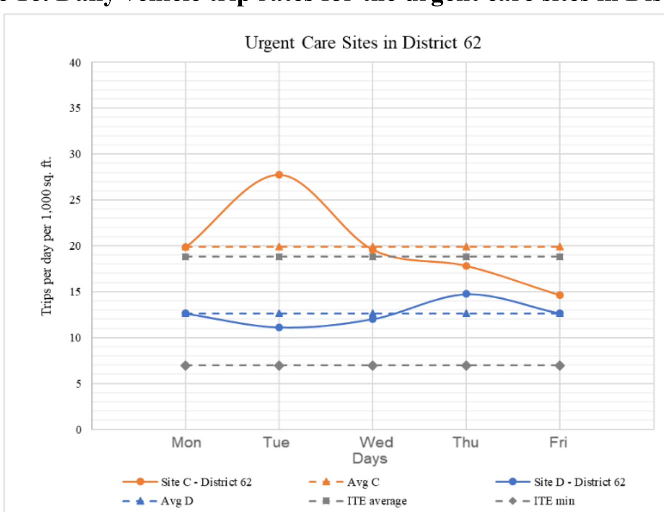
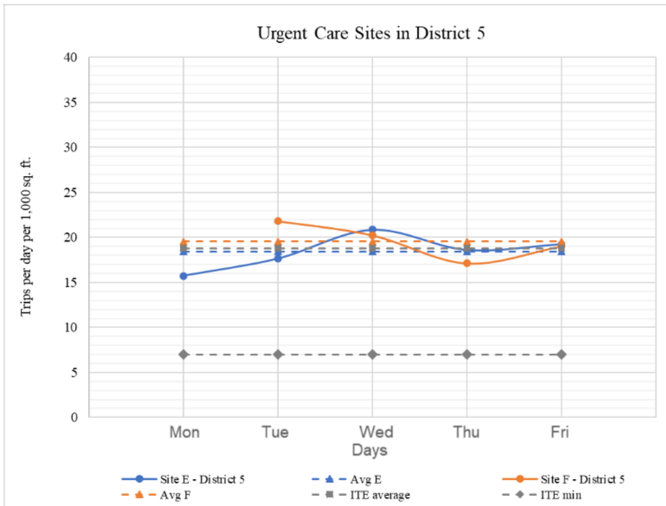


Figure 17 shows that in District 05, Site E shows a clear upward trend on Wednesday. The trip rate is approximately 21 on Wednesday. Its weekday average is 18.4, which is almost the same as the ITE average (18.80).

Figure 17. Daily vehicle trip counts for the urgent care sites in District 05



Site F shows trip rates ranging between 17 and 22. Monday data were excluded because 9 hours were missing. The highest occurs on Tuesday (21.8). Its weekday average is 19.6, which is almost the same as the ITE average (18.80).

Table 19 presents the LMM developed from this data. The intercept of 14.6 represents the expected trip rate for an urgent care site located in a high AADT, high population density, and high jobs per worker tract on an average weekday. The results indicate that AADT does not have a statistically significant effect on trip rates ($p = 0.307$), while both population density and jobs per worker levels are statistically significant. Sites located adjacent to roads with low AADT have, on average, a trip rate that is slightly (approximately 5%) lower compared to those along roads with high AADT. Sites located in tracts with low population density could be expected to generate substantially more trips (50 to 60%). In areas of high population density, there are probably nearby hospitals or full medical care facilities that people would be likely to use. In low-density areas, such facilities are much farther away, so urgent care sites may be used much more often. Sites located in areas with a high jobs per worker ratio could be expected to generate approximately 20% more trips. This suggests that people are more likely to visit urgent care sites near their workplace than those near their home. In areas with few jobs but many workers, people may live there but commute elsewhere, making workplace-based visits more common.

Table 19. Results of the linear mixed model for the urgent care sites

Predictor	Coef. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	14.61	0.74	19.82	< 0.001	[13.16, 16.05]
x_i	-0.83	0.81	−1.02	0.307	[-2.42, 0.76]
z_i	8.51	1.18	7.22	< 0.001	[6.20, 10.81]
w_i	-3.15	0.94	-3.36	0.001	[-4.98, -1.31]
Weekday Var	4.56	50.74			
No. of observations (Days): 29					
$R^2 = 0.93$ • x_i is the indicator variable with constant value 1 if AADT level at the i^{th} site is low and 0 otherwise • z_i is the indicator variable with constant value 1 if population density level at the i^{th} site is low and 0 otherwise • w_i is the indicator variable with constant value 1 if jobs per worker level at the i^{th} site is low and 0 otherwise					

Analysis of Peak Hour Trip Rates

Table 20 presents the details for each urgent care site, including the reported morning and evening peak hours from MS2 and the highest one-hour volume within the ITE-defined peak hour periods. For the morning peak hour, it was found that two sites have peak periods occurring outside the 7:00-9:00 interval. For the evening peak hour, three sites have peak periods occurring outside the 16:00-18:00 interval.

Table 20. MS2 morning and evening peak hours vs. highest one-hour volume for ITE-defined ranges on adjacent roads of selected urgent care sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume within 07:00-09:00	Highest one-hour volume within 16:00-18:00
A	Patient Plus UC, Baton Rouge	5420 Plank Rd, Baton Rouge, LA 70805	Wed 7/22/2020	11:45-12:45	16:30-17:30	8:00-9:00	16:30-17:30
B	Lake UC, Baton Rouge	20152 Highland Road, Baton Rouge	Tue 7/11/2023	11:15-12:15	14:00-15:00	07:00-08:00	16:00-17:00
C	Lake UC, Hammond	14158 W University Ave, Hammond, LA 70401	Tue 1/28/2025	07:00-08:00	16:30-17:30	07:00-08:00	16:30-17:30
D	Lake UC, Denham Springs	8249 Vincent Rd, Denham Springs, LA 70726	Tue 10/8/2024	06:45-07:45	15:30-16:30	07:00-08:00	16:00-17:00
E	South Star UC, Monroe	4015 Sterlington Rd, Monroe, LA 71203	Tue 6/28/2022	07:00-08:00	16:30-17:30	07:00-08:00	16:30-17:30
F	Coastal UC, Ruston	1009 S Service Rd W, Ruston, LA 71270	Thu 9/4/2025	07:00-08:00	15:00-16:00	07:00-08:00	17:00-18:00

Table 21 presents the estimated peak hour trip rates for the urgent care sites compared with the ITE trip rates. Across the four time periods shown in the table, the estimated rates are generally higher than the ITE minimum value. Additionally, the estimated rates during the weekday morning peak hour of the generator for all sites exceed the ITE maximum. During the weekday evening peak hours (adjacent road and generator), hourly rates vary near the ITE average, with some above and others below.

Table 21. Peak hour trip rates for the urgent care sites

Time period	Estimated rate per 1,000 sq. ft. of Gross Floor Area (GFA)						ITE trip rate		
	Site A	Site B	Site C	Site D	Site E	Site F	Average	Minimum	Maximum
Weekday morning peak hour of adjacent road	(1.8)	N/A	0.4	N/A	N/A	(1.6)	(2.23) 0.52	(1.34) 0.32	(5.50) 1.29
Weekday morning peak hour of generator	(2.5)	1.9	2.4	1.6	2.6	(2.6)	(1.79) 1.00	(1.48) 0.84	(2.11) 1.18
Weekday evening peak hour of adjacent road	(2.2)	1.0	1.6	1.2	1.1	(0.6)	(1.06) 2.61	(0.10) 0.23	(6.57) 16.10
Weekday evening peak hour of generator	(3.4)	1.9	2.9	1.5	2.7	(2.4)	(1.69) 2.16	(0.87) 1.11	(14.96) 19.04

* N/A: No trips during the morning peak hour of the adjacent road of the site
* (Entering Rate)

Car Wash Sites

Introduction

Six car washes were selected, two each from Districts 61, 62, and 05. Table 22 shows the information for the six sites along with the accuracy of entering and exiting counts at each site. The analysis was conducted using the most accurate counts, whether entering or exiting.

Table 22. Site details and accuracy of entering and exiting trip rates for the six car wash sites

Week	Site no.	Name	District	Data collection	Area (sq. ft.)	Entering accuracy	Exiting accuracy	Adjustment factor	Monitoring time
7	11 (A)	Tsunami, Geismar	61	Micro-Radar	5,000	118%	97%	1.03	6:30 a.m. until 7:30 p.m.
14	21 (B)	Benny's, Baton Rouge	61	YOLO	7,300	105%	N/A*	0.95	6:30 a.m. until 8:30 p.m.
14	22 (C)	Rocky's Premier, Hammond	62	YOLO	6,250	104%	99%	1.01	7:00 a.m. to 7:30 p.m.
20	30 (F)	PitStop, Slidell	62	YOLO	4230	101%	97%	0.99	8:00 a.m. to 7:00 p.m.
5	6 (D)	Rocketfast, Ruston	05	Micro-Radar	3,900	130%	110%	0.91	7:00 a.m. to 8:00 p.m.
23	37 (E)	Rocketfast, West Monroe	05	YOLO	2,850	104%	99%	1.01	9:45 a.m. until 8:15 p.m.

N/A* at this site, the camera could only capture trip counts from one of the two exiting lanes.

To compare observed trip rates with the ITE trip rates, the ITE Land Use 948—Automated Car Wash was used; see Figure 18. The sites were surveyed in the 1990s, 2000s, and 2020s in California, Colorado, Florida, New Jersey, New York, Pennsylvania, and Washington.

Figure 18. Land Use 948—Automated Car Wash

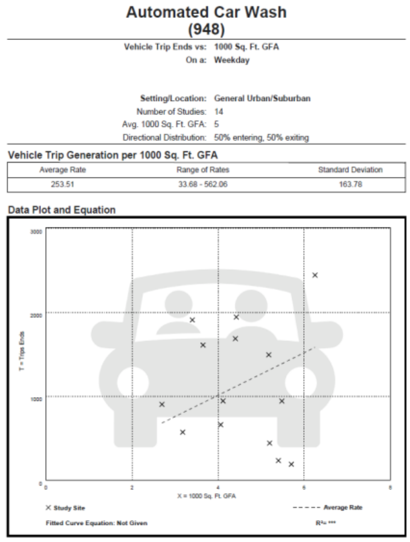


Table 23 presents the daily vehicle trip rates for the six car washes across the five weekdays. The CV across the five weekdays at each site ranged from 17 to 45% and averaged 17%, while the CV across the sites for each weekday ranged from 51 to 66% and averaged 54%. These indicate moderate variation across days and high variation among sites. Among the six car washes studied, Site D recorded the highest mean trip rate, averaging 163.7 and peaking at 211.0 on Friday. In contrast, Site A exhibited the lowest mean trip rate at 34.7, with a minimum value of 20.6 observed on Friday. Across all sites and weekdays, the average trip rate was 91.3.

Table 23. Trip rates and statistics for the car wash sites

Statistic	**District 61**		**District 62**		**District 05**		**Mean**	**Maximum**	**Minimum**	**Variance**	**Standard deviation**	***Coeff. of variation %***
	Site A	**Site B**	**Site C**	**Site F**	**Site D**	**Site E**						
Monday	37.7	130.5	44.9	64.8	135.6	97.8	85.2	135.6	37.7	1808.8	42.5	***49.9***
Tuesday	37.1	49.1	69.8	62.7	126.0	98.9	73.9	126.0	37.1	1090.5	33.0	***44.7***
Wednesday	30.7	51.7	61.4	71.9	142.1	66.3	70.7	142.1	30.7	1433.6	37.9	***53.6***
Thursday	51.9	134.7	50.1		149.3	89.7	95.1	149.3	50.1	2107.2	45.9	***48.3***
Friday	21.2	127.3	70.3	99.0	192.0	129.7	106.6	192.0	21.2	3385.2	58.2	***54.6***
Mean	35.7	98.6	59.3	74.6	149.0	96.5	86.0			1521.8	39.0	***45.4***
Maximum	51.9	134.7	70.3	99.0	192.0	129.7						
Minimum	21.2	49.1	44.9	62.7	126.0	66.3						
Variance	125.9	1950.3	131.8	279.8	652.3	517.6	222.1					
Standard Deviation	11.2	44.2	11.5	16.7	25.5	22.8	14.9					
Coeff. of Variation %	***31.4***	***44.8***	***19.4***	***22.4***	***17.1***	***23.6***	***17.3***					

Site B showed the greatest daily rate fluctuations, with a standard deviation of 44.2 and a CV of 44.8%, indicating highly variable activity throughout the week. This high variability can be explained partly by the significant drop in trip rates on Tuesday and Wednesday, both of which experienced rainfall, bringing the rates to less than half of the average for each site, highlighting the sensitivity of car wash demand to weather conditions. In contrast, Site D, despite its high volume, had the lowest CV at 17.1%.

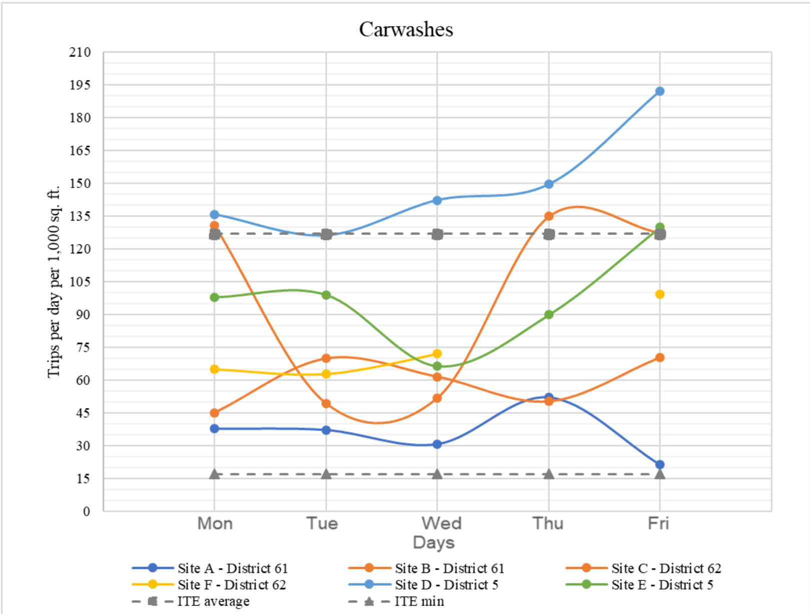
Table 24 shows that all sites had weekday averages that are below the ITE average rate (except Site D), which is above the ITE average rate by 18%.

Table 24. Trip rates for the car wash sites

	Site A	*Site B*	*Site C*	*Site F*	*Site D*	*Site E*
Estimated Rate "Weekday Average"	35.7	98.6	59.3	74.6	149.0	96.5
ITE Trip Rate per weekday	126.76	126.76	126.76	126.76	126.76	126.76

Figure 19 presents the daily vehicle-trip rates for the six car washes. No clear pattern for the trip rates is observed across the sites. Considering that and the high CVs between sites, the data support analyzing the sites without grouping using an LMM.

Figure 19. Daily vehicle trip rates for the car wash sites



The variability across weekdays for each individual site, ranging from 44 to 55%, indicates that daily fluctuations are significant and that collecting data for each day of the week is crucial. These results suggest that car wash demand is highly sensitive to the day of the week. The variability between the same weekday across different sites was also high, with CV values ranging from 51 to 66%. This shows the influence of site-specific characteristics on trip rates, such as AADT, population density, or jobs per worker ratio. These high CVs between both days and sites underscore the importance of accounting for both temporal and spatial factors when modeling car wash trip rates. Table 25 summarizes the contextual characteristics of each site.

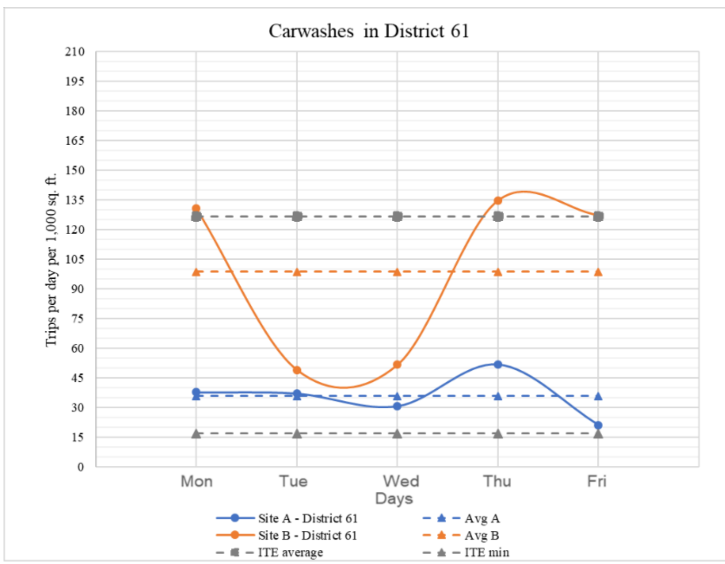
Table 25. Contextual factor levels for the car wash sites

Sites	AADT level	Population density level	Jobs per worker level
Site A	Low	Low	Low
Site B	High	High	High
Site C	Low	Low	High
Site D	Low	Low	High
Site E	High	High	High
Site F	High	High	Low

Districts

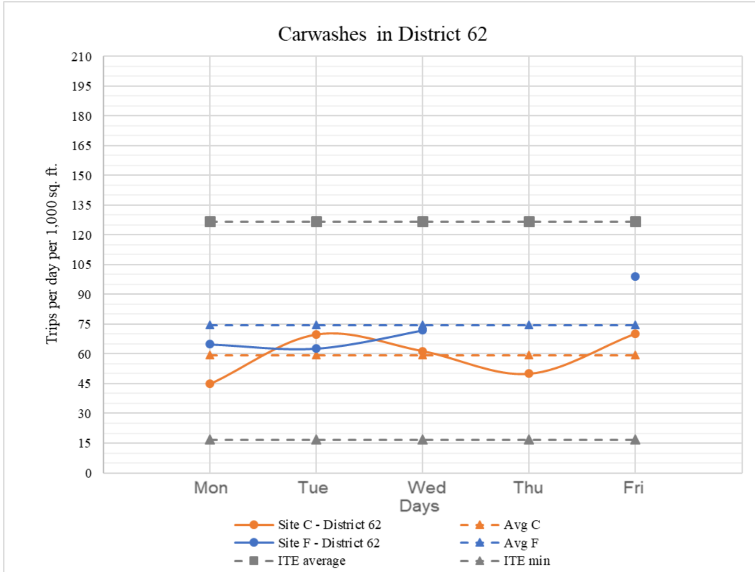
In District 61, Site A recorded the lowest average trip rate (35.7) and had a CV of 31.4%, as shown in Figure 20. Its highest trip rate occurred on Thursday (51.9) and the lowest on Friday (21.2). Site B, in contrast, showed significantly higher and more variable trip rates, averaging 98.6, peaking at 134.7 on Thursday, and showing a minimum of 49.1 on Tuesday. Its CV of 44.8% was the highest among all sites. The average rates at both sites are below the ITE average rate.

Figure 20. Daily vehicle trip rates for the car wash sites in District 61



In District 62, shown in Figure 21, Site C recorded a mean of 59.3 trips and a CV of 19.4%. It peaked on Friday (70.3) and reached its minimum on Monday (44.9). Site F, which was missing data for Thursday due to rain, had a mean of 74.6 trips and a CV of 22.4%. It also peaked on Friday with a rate of 99.0 trips and a minimum on Monday of 62.7 trips. All of these rates are below the ITE average, but above the ITE minimum.

Figure 21. Daily vehicle trip rates for the car wash sites in District 62



In District 05, Site D had the highest trip rates across all days and sites, averaging 149.0, with a peak of 192.0 on Friday, as shown in Figure 22. Its CV was the lowest at 17.1%. Site E recorded an average of 96.5, and the CV was 23.6%. Its peak occurred on Friday (129.7), and the lowest value was observed on Wednesday (66.3). The highest trip rates generally occurred on Thursdays and Fridays, while the lowest trip rates varied across different days at each site. In contrast to other districts, the average trip rate at Site D exceeds the ITE average trip rate.

After investigating the contextual variables across the five sites, it was found that AADT and population density were identical at each site, making it impossible to include both in the same model. It is also important to note that the jobs per worker variable is unbalanced. Therefore, each of the three variables was tested individually using LMM, followed by a model combining AADT and jobs per worker, which also effectively represents a model incorporating both population density and jobs per worker as contextual variables. Trip rates on Site B for Tuesday and Wednesday were excluded from the model because those days experienced rainfall, which affected travel behavior.

Figure 22. Daily vehicle trip rates for the car wash sites in District 05

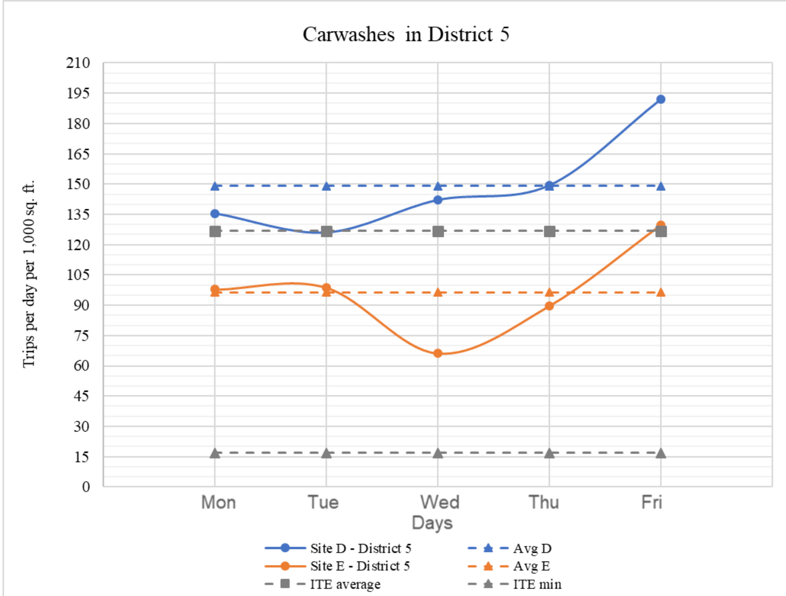


Table 26 presents the LMM, where the dependent variable is the weekday trip rate and the independent variable is the jobs per worker level. The analysis shows that AADT does not have a significant effect on weekday trip rates for car washes, whereas the jobs per worker variable does.

Table 26. LMM Results for car wash sites analyzing the impact of AADT and jobs per worker levels on weekday trip rates

Predictor	Coeff. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	118.85	10.11	11.75	<0.001	[99.03, 138.67]
x_i	-13.63	15.79	-0.86	0.388	[-44.58, 17.33]
z_i	-58.52	15.67	-3.73	<0.001	[-89.23, -27.81]
Weekday Var	841.94				
No. of observations (Days): 27					
$R^2 = 0.89$ • x_i is the indicator variable with value 1 if AADT level at the i^th^ site is low and 0 otherwise • z_i is the indicator variable with value 1 if jobsper worker level at the i^th^ site is low and 0 otherwise					

The intercept of 118.9 in Table 26 represents the approximate expected weekday trip rate for a site located in a tract with high AADT and high jobs per worker ratio. AADT does not have a statistically significant effect on trip rates ($p = 0.388$), while jobs per worker shows a significant effect ($p < 0.001$). Sites in low AADT areas showed a negligible average decrease of 11%, whereas sites in low jobs per worker areas could be expected to generate approximately 50% fewer trips. The results suggest that people are more likely to use car washes in areas where there is a high level of jobs per worker. Including weekday as a random effect captured temporal variability across sites. The variance component for weekdays was also relatively high (842), affirming the importance of accounting for temporal fluctuations. Overall, these results support that the jobs per worker ratio is a critical contextual factor influencing the trip rates of car washes, although population density might also be a critical contextual factor.

Analysis of Peak Hour Trip Rates

Table 27 presents the details for each car wash site, including the reported morning and evening peak hours and the highest one-hour volume within the ITE-defined peak hour periods. For the morning peak hour, it was found that three sites have peak periods outside the 7:00-9:00 interval. For the evening peak hour, two sites have peak periods outside the 16:00-18:00 interval.

Table 28 presents the estimated peak hour trip rates for the car wash sites compared with the ITE trip rates. For the weekday morning peak hour of the adjacent road, all sites have trip rates below the ITE average. During the morning peak hour of the generator, all sites are below the minimum ITE rate except Site D, which is above the ITE rate. During the weekday evening peak hour of the adjacent road and the generator, the estimated rates are lower than the ITE average for all sites, except for Site D.

Table 27. MS2 morning and evening peak hours vs. highest one-hour volume for ITE-defined ranges on adjacent roads of selected car wash sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume within 07:00-09:00	Highest one-hour volume within 16:00-18:00
A	Tsunami, Geismar	36494 Hwy 74, Geismar, LA 70734	Wed 3/26/2025	06:45-07:45	15:30-16:30	07:00-08:00	16:00-17:00
B	Benny's, Baton Rouge	8370 Siegen Ln, Baton Rouge, LA 70810	Tue 3/17/2020	11:45-12:45	16:30-17:30	08:00-09:00	16:30-17:30
C	Rocky's Premier, Hammond	14584 W University Ave, Hammond, LA 70401	Tue 1/28/2025	07:00-08:00	16:30-17:30	07:00-08:00	16:30-17:30
F	PitStop, Slidell	1725 Gause Blvd E, Slidell, LA 70461	Wed 2/21/2024	07:00-08:00	17:00-18:00	07:00-08:00	17:00-18:00
D	Rocketfast, Ruston	1822 Northpointe Ln, Ruston, LA 71270	Wed 7/19/2023	07:15-08:15	16:30-17:30	07:15-08:15	16:30-17:30
E	Rocketfast, West Monroe	2900 Cypress St, West Monroe, LA 71291	Tue 3/11/2025	11:45-12:45	12:00-13:00	07:00-08:00	16:00-17:00

Table 28. Peak hour trip rates for the car wash sites

Time period	Estimated rate per 1,000 sq. ft. of Gross Floor Area (GFA)						ITE trip rate per 1,000 sq. ft. of Gross Floor Area (GFA) (12th Edition)		
	Site A	Site B	Site C	Site F	Site D	Site E	Average	Minimum	Maximum
Weekday morning peak hour of adjacent road	1.0	(5.4)	0.7	N/A	2.1	2.6	(8.19) 6.70	(1.74) 1.42	(19.09) 15.62
Weekday morning peak hour of generator	4.6	(10.1)	4.8	(8.7)	15.2	12.0	(13.39) 12.86	(6.74) 6.48	(22.20) 21.33
Weekday evening peak hour of adjacent road	2.8	(7.4)	7.2	(4.4)	14.0	10.3	(11.96) 12.44	(1.55) 1.61	(23.82) 24.80
Weekday evening peak hour of generator	5.2	(10.6)	8.1	(9.6)	16.1	14.5	(12.39) 12.39	(2.11) 2.11	(24.71) 24.71

N/A: No trips from/to the site during the morning peak hour of the adjacent road
* (Entering Rate)

Apartment Complex Sites

Introduction

Six apartment complexes were selected, two each from Districts 61, 62, and 05. Table 29 shows the information for the six residential apartment sites, along with the accuracy of entering and exiting counts at each site. The analysis was conducted using the exiting counts, except for Site C, where the accuracy of exiting counts is not acceptable (47%).

To compare the observed trip rates with the ITE trip rates, ITE Land Use 220—Multifamily Housing (Low-Rise) Not Close to Rail Transit was used; see Figure 23. The sites were surveyed in the 1990s, 2000s, 2010s, and 2020s in Arizona, British Columbia (CAN), California, Delaware, Florida, Illinois, Maine, Massachusetts, Minnesota, New Jersey, New York, Ontario (CAN), Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Utah, and Washington.

Table 29. Site details and accuracy of entering and exiting trip rates for the six apartment complex sites

Week	Site no.	Name	District	Number of units	Data collection	Entering accuracy	Exiting accuracy	Adjustment factor	Monitoring time
9	13 (A)	Indigo Park	61	330	YOLO	104	102	0.98	6:30 a.m. until 8:00 p.m.
26	18 (B)	Manchac Lake	61	272	YOLO	101	101	0.99	6:30 a.m. until 8:00 p.m.
12	19 (C)	Acadian Village	62	28	Micro-Radar	92	47	1.09	6:30 a.m. until 8:00 p.m.
20	31 (D)	Brookstone Park	62	240	YOLO	… *	104	0.97	6:30 a.m. until 8:00 p.m.
15	23 (E)	Park Ridge	05	60	YOLO	100	100	1.00	6:30 a.m. until 8:00 p.m.
25	5 (F)	Ashford Place	05	338	YOLO	99	100	1.00	6:30 a.m. until 8:00 p.m.

… *: Not available at this site, as the camera was only able to capture exiting trip counts.

Figure 23. Land Use 220—Multifamily Housing (Low-Rise) Not Close to Rail Transit

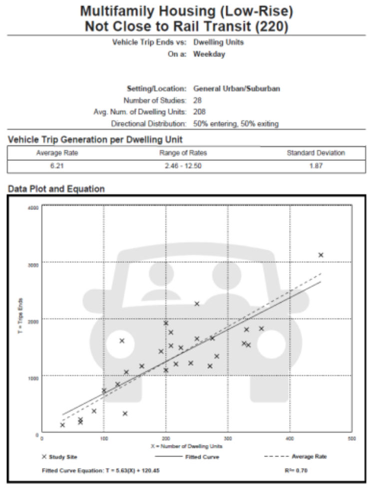


Table 30 presents the daily vehicle trip rates for the six apartment complex sites across five weekdays. The variation across the five weekdays at each site ranged between 4 and 8%, except for Site E, which had a CV of approximately 17%. This higher variation at Site E was due to a significant decrease in the number of trips on Tuesday, caused by heavy winds and rain. This high CV at Site E highlights the sensitivity of apartment trip rates to weather conditions. The variation by site is moderate, averaging 12%. The variation across the sites for each weekday ranged between 19 and 50%, averaging 47%, which shows high variability by day. Among the six apartment complex sites, Site E recorded the highest mean trip rate, averaging 4.0 daily trips per dwelling unit, peaking at 4.6 on Thursday. In contrast, Site C exhibited the lowest mean trip rate at 1.4, with a minimum of 1.2 observed on Monday. Across all sites and weekdays, the overall average trip rate was 2.0 trips per dwelling unit per day.

Table 30. Trip rates and statistics for the apartment complex sites

Daily trips per dwelling unit	**District 61**		**District 62**		**District 05**		**Mean**	**Maximum**	**Minimum**	**Variance**	**Standard deviation**	***Coeff. of variation (CV) %***
	Site A	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**						
Monday	1.86	2.23	1.24	1.50	….*	1.76	1.72	2.23	1.24	0.14	0.37	***21.70***
Tuesday	1.75	2.07	1.32	1.67	3.25	1.85	1.99	3.25	1.32	0.44	0.67	***33.57***
Wednesday	1.80	2.04	1.36	1.56	4.20	1.94	2.15	4.20	1.36	1.07	1.03	***48.13***
Thursday	1.90	1.94	1.55	1.78	4.57	1.92	2.28	4.57	1.55	1.28	1.13	***49.60***
Friday	1.99	2.34	1.36	1.73	….*	2.10	1.90	2.34	1.36	0.14	0.37	***19.68***
Mean	1.86	2.12	1.37	1.65	4.01	1.91	2.02			0.89	0.94	***46.68***
Maximum	1.99	2.34	1.55	1.78	4.57	2.10						
Minimum	1.75	1.94	1.24	1.50	3.25	1.76						
Variance	0.01	0.03	0.01	0.01	0.46	0.02	0.05					
Standard Deviation	0.09	0.16	0.11	0.12	0.68	0.13	0.22					
Coeff. of Variation (CV) %	***4.88***	***7.48***	***8.38***	***7.14***	***16.96***	***6.54***	***10.77***					

… Approximately 9 hours were missed, the day count has been excluded.*

Table 31 shows the average trip rates per weekday per dwelling unit for the six apartment complex sites compared to the ITE trip rates. This shows that the average trip rates for the Louisiana apartments are generally lower than the ITE average trip rate, except Site E. For this reason, apartment complexes warrant further examination in future research.

Table 31. Trip rates for the apartment complex sites

	Site A	*Site B*	*Site C*	*Site D*	*Site E*	*Site F*
Estimated average trip rate	1.82	2.14	1.37	1.65	4.01	1.94
ITE average trip rate	3.11	3.11	3.11	3.11	3.11	3.11
ITE min trip rate	1.23	1.23	1.23	1.23	1.23	1.23
ITE max trip rate	6.25	6.25	6.25	6.25	6.25	6.25

Table 32 summarizes the contextual characteristics of each site. In District 62, the population density level at Site C is higher than at Site D, but Site D has a higher trip rate. A similar pattern is observed in District 05, where Site E has a lower population density level than Site F, but a higher trip rate. The same pattern is evident for the jobs per worker levels.

Table 32. Contextual factor levels for apartment complex sites

Sites	AADT level	Population density level	Jobs per worker level
Site A	Low	High	Low
Site B	High	High	Low
Site C	High	High	High
Site D	Low	Low	Low
Site E	Low	Low	Low
Site F	Low	High	High

Figure 24, Figure 25, and Figure 26 present the daily vehicle trip rates per dwelling unit for the six apartment complex sites. A pattern in travel behavior was observed at both apartment complex sites in Districts 61 and 62. However, this pattern was less clear for the two apartment complex sites in District 05. As mentioned previously, the data collected for Site E on Tuesday were affected by severe weather conditions. Considering this and the high coefficients of variation between sites, the data support analyzing sites individually to investigate the effect of contextual factors on trip rates, rather than grouping them using the LMM approach.

Districts

In District 61, Site A recorded an average daily trip rate of 1.9 trips per dwelling unit, with a CV of 4.9%. Its highest trip rate was on Friday (2.0), and the lowest was on Tuesday (1.8). In contrast, Site B showed higher trip rates, averaging 2.1 trips, peaking at 2.3 on Friday, and a minimum of 1.9 on Tuesday, with a CV of 8%, indicating slightly higher variability than Site A. Overall, the trip rates in District 61 were relatively consistent across the two sites.

In District 62, Site C exhibited an average daily trip rate of 1.4 trips per dwelling unit, ranging from 1.2 on Monday to 1.6 on Thursday, and a CV of 8%. Site D had higher trip rates, averaging 1.7, peaking at 1.8 on Thursday, and dropping to a minimum of 1.5 on Monday, with a CV of 7%. These results indicate that Site D generated slightly more trips on average, but both sites maintained relatively stable trip patterns throughout the week.

Figure 24. Daily vehicle trip rates for the apartment complex sites in District 61

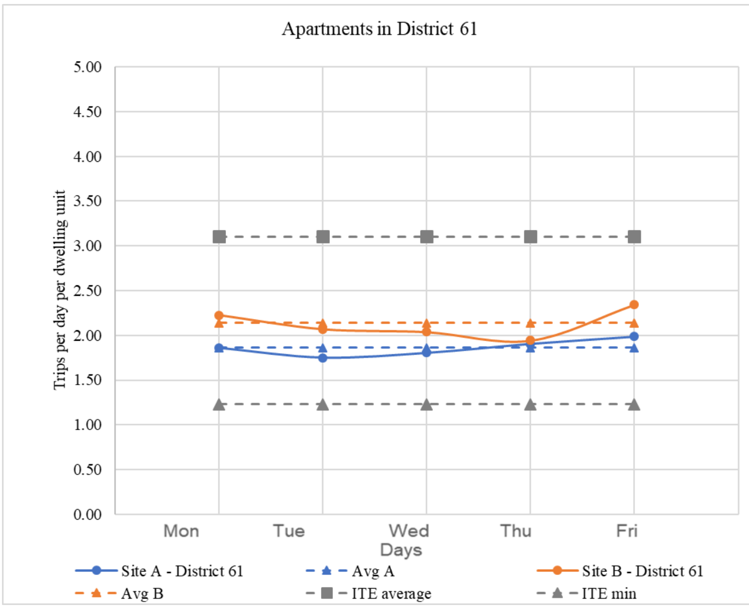


Figure 25. Daily vehicle trip rates for the apartment complex sites in District 62

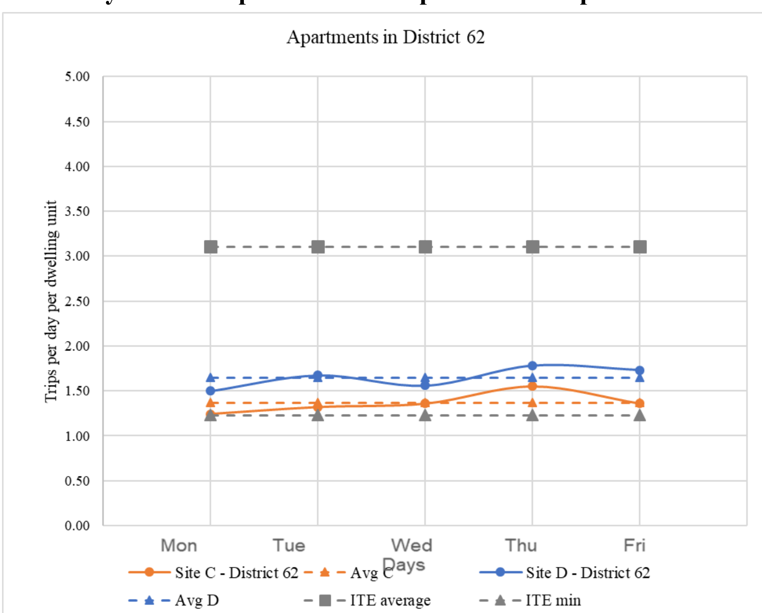


Figure 26. Daily vehicle trip rates for the apartment complex sites in District 05

In District 05, Site E recorded the highest mean daily trip rate among all sites, averaging 4.0 trips per dwelling unit, with a peak of 4.6 on Thursday and a minimum of 3.3 on Tuesday. The CV of 17% at this site reflects the sensitivity of apartment trip rates to the severe weather on Tuesday, noting that trip counts for Monday and Friday were missing. Site F had a much lower mean trip rate of 1.9, with a peak of 2.1 on Friday and a minimum of 1.8 on Monday, showing more stable travel behavior with a CV of 7%. The high variability at Site E highlights how extreme weather events can influence apartment trip rates.

Table 33 presents the results of the LMM. The results indicate that the baseline trip rate, when all categorical variables are set to the reference level (High), is 1.5. AADT shows a significant positive effect ($\beta = 0.21$, $p = 0.06$), suggesting that apartment complex sites where the adjacent road has lower AADT levels are associated with higher trip rates compared to sites where the adjacent road has a higher AADT. Population density has a significant negative relationship with trip rates ($\beta = -0.42$, $p = 0.005$), indicating that apartment sites in tracts with low population density are associated with lower trip rates. In contrast, the jobs per worker ratio shows a significant positive effect ($\beta = 0.40$, $p < 0.001$), indicating that apartment complex sites located in tracts with low jobs per worker ratios are associated with higher trip rates. Overall, these findings highlight that traffic and socioeconomic factors significantly influence trip rates at apartment complex sites.

Table 33. LMM results for apartment complex sites analyzing the impact of AADT levels on weekday trip rates

Predictor	Coef. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	1.48	0.098	15.16	<0.001	[1.29, 1.68]
x_i	0.21	0.113	1.85	0.06	[-0.01, 0.43]
z_i	-0.42	0.149	-2.78	0.005	[-0.71, -0.12]
y_i	0.40	0.113	3.77	<0.001	[0.21, 0.65]
Weekday Var	0.032				
No. of observations (Days):		28 (***About 9 hours were missed from two days, and thus they were excluded)***			
$R^2 = 0.89$					
• x_i is the indicator variable with value 1 if AADT level at the ith site is low and 0 otherwise					
• z_i is the indicator variable with value 1 if population density level at the ith site is low and 0 otherwise					
• y_i is the indicator variable with value 1 if jobs per worker level at the ith site is low and 0 otherwise					

Analysis of Peak Hour Trip Rates

Table 34 presents the details for each site, including the reported morning and evening peak hours from MS2 and the highest one-hour volume within the ITE-defined peak hour periods. For the morning peak hour, it was found that one site has a peak period occurring outside the 7:00-9:00 interval. For the evening peak hour, two sites have peak periods occurring outside the 16:00-18:00 interval.

Table 34. MS2 morning and evening peak hours vs. highest one-hour volume for ITE-defined ranges on adjacent roads of selected apartment complex sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume within 07:00-09:00	Highest one-hour volume within 16:00-18:00
A	Indigo Park	11959 Nicholson Dr, Baton Rouge, LA 70810	Wed 6/21/2023	07:15-08:15	16:30-17:30	07:15-08:15	16:30-17:30
B	Manchac Lake	17950 Airline Highway, Prairieville, LA 70769	Wed 4/9/2025	06:45-07:45	15:45-16:45	07:00-08:00	16:00-17:00
C	Acadian Village	71153 LA-21, Covington, LA 70433	Tue 2/20/2024	07:15-08:15	16:15-17:15	07:15-08:15	16:15-17:15
D	Brookstone Park	1842 Ochsner Blvd, Covington, LA 70433	Tue 2/20/2024	07:15-08:15	15:30-16:30	07:15-08:15	16:00-17:00
E	Park Ridge	403 Rich Smith Ln, Ruston, LA 71270	Wed 4/19/2023	07:00-08:00	16:30-17:30	07:00-08:00	16:30-17:30
F	Ashford Place	107 Ashford Dr, West Monroe, LA 71291	Wed 4/9/2025	07:00-08:00	16:45-17:45	07:00-08:00	16:45-17:45

Table 35 presents the estimated peak hour trip rates for the apartment complex sites compared to the ITE trip rates. Across the four time periods shown in the table, the estimated rates are generally lower than the ITE average, except for Site C during the weekday morning peak hour of the generator. The estimated rates for all sites exceed the ITE minimum, except for Site D during the weekday morning peak hour of the generator. Three of the hourly estimated rates for Site E exceed the ITE maximum. The exiting trip rates during the weekday morning peak hour on the adjacent road are similar to those during the weekday morning peak hour of the generator, showing that the morning peak hour of the apartment complex sites aligns with the morning peak hour of the adjacent road.

Table 35. Peak hour trip rates for the apartment complex sites using the exiting counts

Time period	Estimated rate per apartment complex site						ITE trip rate per apartment complex site (12th Edition)		
	Site A	Site B	Site C	Site D	Site E	Site F	Average	Minimum	Maximum
Weekday morning peak hour of adjacent road	0.22	0.29	(0.08)	0.11	0.57	0.30	(0.10) 0.31	(0.03) 0.10	(0.18) 0.55
Weekday morning peak hour of generator	0.22	0.30	(0.14)	0.11	0.57	0.30	(0.13) 0.34	(0.07) 0.19	(0.20) 0.53
Weekday evening peak hour of adjacent road	0.14	0.15	(0.10)	0.08	0.37	0.15	(0.32) 0.20	(0.05) 0.03	(0.64) 0.40
Weekday evening peak hour of generator	0.17	0.17	(0.18)	0.10	0.53	0.17	(0.37) 0.25	(0.15) 0.10	(0.76) 0.50

* (Entering Rate)

Drive-Thru Bank Sites

Introduction

Six drive-thru banks were selected, two each from Districts 61, 62, and 05. Table 37 shows the information for the six drive-thru banks, along with the accuracy of entering and exiting counts at each site.

Table 36. Site details and accuracy of entering and exiting trip rates for the six drive-thru bank sites

Week	Site No.	Name	District	Area (sq. ft.)	Data collection	Entering accuracy	Exiting accuracy	Adjustment factor	Monitoring time
8	12 (A)	Regions Bank, Gonzales	61	5800	YOLO	102	110	0.98	8:30 a.m. until 5:30 p.m.
19	29 (B)	Regions Bank, Zachary	61	3900	YOLO	… *	95	1.05	8:45 a.m. until 5:15 p.m.
17	26 (C)	Hancock Whitney Bank	62	3400	YOLO	105	104	0.96	8:30 a.m. until 5:30 p.m.
21	33 (D)	First Guaranty Bank	62	3900	YOLO	102	113	0.98	8:00 a.m. until 6:00 p.m.
3	4 (E)	Ouachita Valley FCU	05	3800	Micro-Radar	93	96	1.04	7:30 a.m. until 6:30 p.m.
13	20 (F)	Louisiana National Bank	05	11200	YOLO	114	109	0.92	8:00 a.m. until 6:00 p.m.

… *: Not available at this site, because the camera was only able to capture exiting trip counts.

To compare the observed trip rates with ITE trip rates, ITE Land Use 912—Drive-in Bank was used; see Figure 27. The sites were surveyed in the 2000s, 2010s, and 2020s in Colorado, Kentucky, Minnesota, Nebraska, New Jersey, New York, Ohio, Oregon, Pennsylvania, Texas, Vermont, Virginia, Washington, and Wisconsin.

Figure 27. Land Use 912—Drive-in Bank

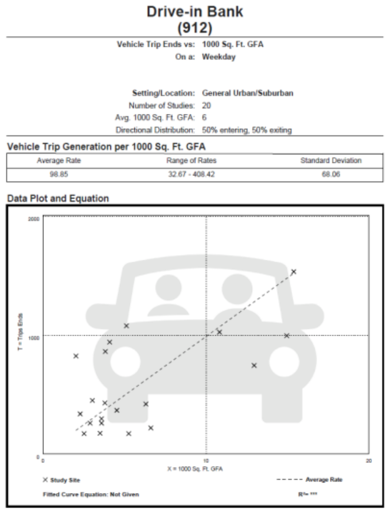


Table 37 presents the daily vehicle-trip rates for the six drive-thru bank sites across five weekdays. The CV across the five weekdays at each site ranged between 10 and 24% and averaged 22%, indicating moderate variability. The variation across the sites for each weekday ranged between 57 and 119%, with an average of 103%, indicating very high variability. Site E recorded the highest mean trip rate, averaging 232.7, which is above the ITE average (49.43), peaking at 282.1 on Friday. In contrast, Site C exhibited the lowest mean trip rate at 21.6, with a minimum of 19.6 observed on Wednesday. Across all sites and weekdays, the overall average trip rate was 77.2.

Table 37. Trip rates and statistics for the drive-thru bank sites

Daily trips per 1,000 sq. ft.	District 61		District 62		District 05		Mean	Maximum	Minimum	Variance	Standard deviation	*Coeff. of variation (CV) %*
	Site A	Site B	Site C	Site D	Site E	Site F						
Monday	50.1	47.3	102.2	25.5	…*	…*	56.3	102.2	25.5	1056.4	32.5	***57.8***
Tuesday	52.5	48.7	79.0	18.3	278.8	20.5	82.9	278.8	18.3	9708.5	98.5	***118.8***
Wednesday	52.3	39.5	84.0	19.3	183.7	19.6	66.4	183.7	19.3	3883.4	62.3	***93.8***
Thursday	54.5	50.3	97.4	21.5	186.2	21.8	71.9	186.2	21.5	3907.0	62.5	***86.9***
Friday	74.8	60.8	136.1	30.8	282.1	24.6	101.5	282.1	24.6	9418.1	97.0	***95.6***
Mean	56.8	49.3	99.7	23.1	232.7	21.6	77.2			6366.2	79.8	***103.3***
Maximum	74.8	60.8	136.1	30.8	282.1	24.6						
Minimum	50.1	39.5	79.0	18.3	183.7	19.6						
Variance	103.4	58.1	503.3	26.4	3038.6	4.7	299.1					
Standard deviation	10.2	7.6	22.4	5.1	55.1	2.2	17.3					
Coeff. of variation (CV) %	***17.9***	***15.5***	***22.5***	***22.2***	***23.7***	***10.0***	***22.4***					

… About 9 hours were missed, thus the day count has been excluded.*

Table 39 shows the average trip rates for the six drive-thru bank sites compared to the ITE trip rates. The average trip rates for Site A and Site B in District 61 are very close to the ITE average trip rate (49.43). For District 62, the average trip rate of Site D is above the ITE minimum trip rate (16.34) but below the ITE average trip rate, while Site C is above the ITE average trip rate (49.43). For the sites in District 05, Site F is below the ITE average rate (49.43), while Site E is above the ITE maximum trip rate (204.21). Table 40 summarizes the contextual characteristics of each site.

Table 38. Trip rates for the drive-thru bank sites

	Site A	*Site B*	*Site C*	*Site D*	*Site E*	*Site F*
Estimated average trip rate	56.8	49.3	99.7	23.1	232.7	21.6
ITE average trip rate	49.43	49.43	49.43	49.43	49.43	49.43
ITE min trip rate	16.34	16.34	16.34	16.34	16.34	16.34
ITE max trip rate	204.21	204.21	204.21	204.21	204.21	204.21

Table 39. Contextual factor levels for the drive-thru bank sites

Sites	AADT level	Population density level	Jobs per worker level
Site A	High	Low	High
Site B	High	Low	Low
Site C	Low	High	High
Site D	High	High	Low
Site E	High	High	High
Site F	High	Low	High

Figure 28, Figure 29, and Figure 30 present the daily vehicle trip rates for the six drive-thru bank sites. A pattern in trip rates across weekdays was observed at the two drive-thru banks for both Districts 61 and 62. However, this pattern was less clear for the two drive-thru bank sites in District 05. Given this, the six sites were included in the LMM to investigate the effect of contextual factors on trip rates, without grouping them by district.

Figure 28. Daily vehicle trip rates for the drive-thru bank sites in District 61

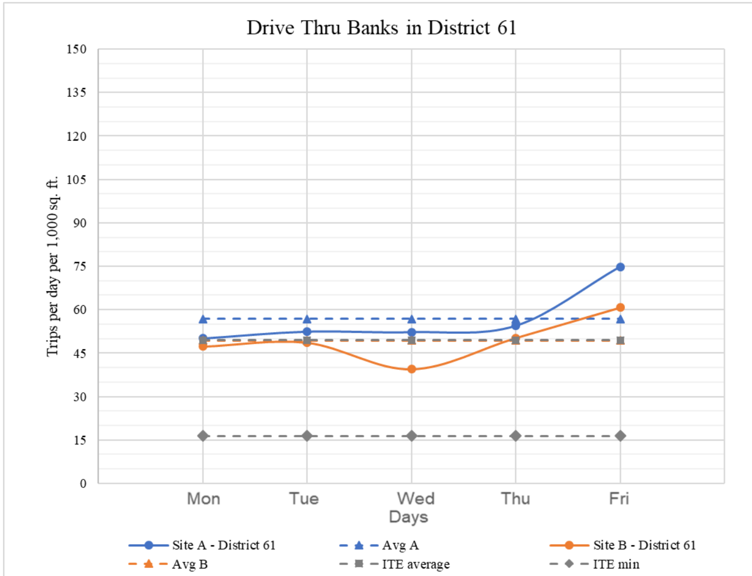


Figure 29. Daily vehicle trip rates for the drive-thru bank sites in District 62

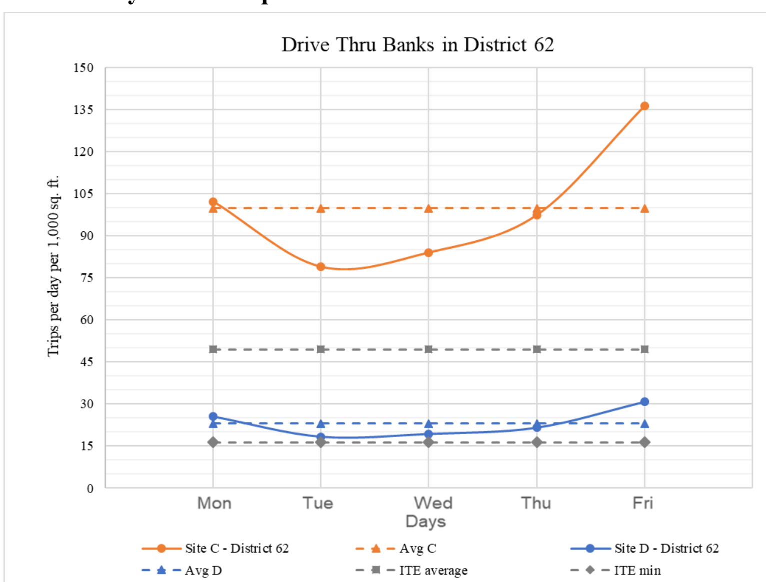
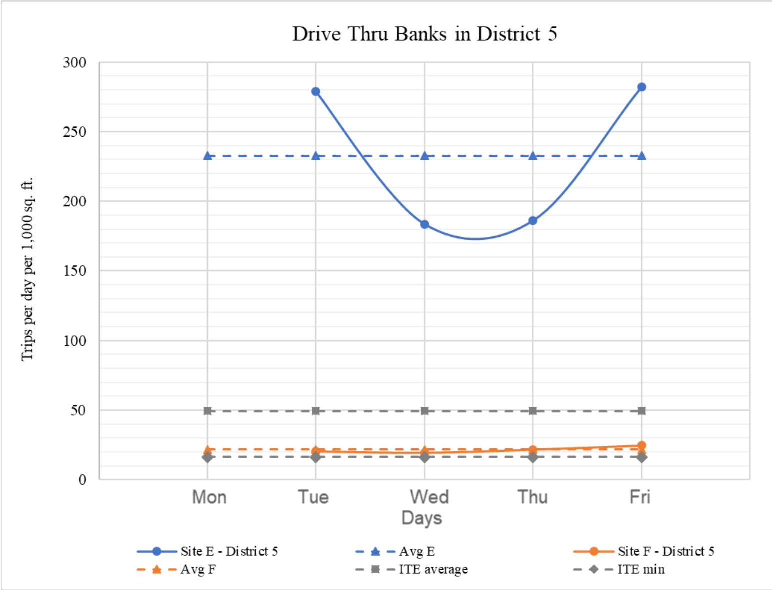


Figure 30. Daily vehicle trip rates for the drive-thru bank sites in District 05



Districts

In District 61, Site A recorded the highest mean trip rate, averaging 56.8, with a peak of 74.8 on Friday and a minimum of 50.1 on Monday. In contrast, Site B showed a lower mean trip rate of 49.3, with a maximum of 60.8 on Friday and a minimum of 39.5 on Wednesday. Site A showed a higher CV at 17.9%, compared to Site B at 15.5%. The trip rates in District 61 were relatively consistent across the weekdays for the two sites.

In District 62, Site C had a mean trip rate of 99.7, ranging from 79.0 on Tuesday to a maximum of 136.1 on Friday. Site D showed considerably lower daily trip rates, averaging 23.1 with a peak of 30.8 on Friday and a minimum of 18.3 on Tuesday. The CV for Site C was 22.5%, while Site D had a CV of 22.2%, suggesting a similarly variable pattern.

In District 5, Site E recorded the highest mean trip rate of 232.7, peaking at 282.1 on Friday and dropping to 183.7 on Wednesday. Site F had a mean of 21.6 daily trips, with a maximum of 24.6 on Friday and a minimum of 19.6 on Wednesday. The CV for Site E was 23.7%, while Site F had a lower CV of 10%. The highest trip rates were recorded on Friday across all six sites.

Because Site E has much higher trip rates than the other five banks and is the only Federal Credit Union, results were also analyzed without this site. This results in a decrease in the average trip rate from 77.2 trips to 51.3. The CV across sites decreased from 103 to 62%, and across days of the week it decreased from 22.4 to 18.4%. This still leaves the variation across sites as very high, and the day-to-day variation as moderate.

Table 41 shows the results of the LMM and indicates that the baseline trip rate, when all categorical variables are set to the reference level (high), is 112.4. The coefficient for the AADT level is statistically insignificant ($p = 0.722$), suggesting that traffic volume on the adjacent road for these sites does not influence trip rates at the drive-thru bank sites. In contrast, both the population density and jobs per worker factors were statistically significant, with negative coefficients ($\beta = -45.65$, $p = 0.024$, and $\beta = -54.22$, $p = 0.033$, respectively). These results suggest that drive-thru bank sites located in tracts with higher population density (+40%) and higher jobs per worker ratios (+48%) generated more trips compared to those in lower-density areas or areas with lower jobs per worker ratios. This outcome is reasonable because higher population density increases demand for banking services in the surrounding area. Overall, these findings highlight that socioeconomic factors significantly influence trip rates at drive-thru bank sites.

Table 40. LMM results for drive-thru bank sites investigating the effect of contextual factors on weekday trip rates

Predictor	Coef. (β)	Standard Error	z-value	p-value	95% CI
(Intercept)	112.37	17.38	6.467	<0.001	[78.32, 146.43]
x_i	-8.73	24.53	-0.356	0.722	[-56.81, 39.35]
z_i	-45.65	20.23	-2.250	0.024	[-85.41, -5.90]
y_i	-54.22	25.49	-2.127	0.033	[-104.18, -4.25]
Weekday Var	1980.46				
No. of observations (Days): 28					
$R^2 = 0.91$					

- x_i is the indicator variable with value 1 if AADT level at the i^{th} site is low and 0 otherwise
- z_i is the indicator variable with value 1 if population density level at the i^{th} site is low and 0 otherwise
- y_i is the indicator variable with value 1 if jobs per worker level at the i^{th} site is low and 0 otherwise

Analysis of Peak Hour Trip Rates

Table 42 presents the details of each drive-thru bank site, including the reported morning and evening peak hours from MS2 and the highest one-hour volume within the ITE-defined peak hour periods. For the morning peak hour, it was found that four sites have peak periods outside the 7:00-9:00 interval. For the evening peak hour, two sites have peak periods outside the 16:00-18:00 interval.

Table 41. MS2 morning and evening peak hours vs. highest one-hour volumes from ITE-defined ranges on adjacent roads of selected drive-thru bank sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume within 07:00-09:00	Highest one-hour volume within 16:00-18:00
A	Regions Bank, Gonzales	508 N Airline Hwy, Gonzales, LA 70737	Wed 12/23/2020	11:00-12:00	12:00-13:00	07:00-08:00	16:00-17:00
B	Regions Bank, Zachary	4919 Main St, Zachary, LA 70791	Tue 3/21/2023	11:00-12:00	16:15-17:15	08:00-09:00	16:15-17:15
C	Hancock Whitney Bank	1010 S Range Ave, Denham Springs, LA 70726	Wed 7/25/2018	11:00-12:00	16:15-17:15	08:00-09:00	16:15-17:15
D	First Guaranty Bank	29815 Walker South Rd, Walker, LA 70785	Wed 1/26/2022	07:15-08:15	16:00-17:00	07:15-08:15	16:00-17:00
E	Ouachita Valley Federal CU	2400 Louisville Ave, Monroe, LA 71201	Wed 3/12/2025	11:00-12:00	12:00-13:00	08:00-09:00	16:00-17:00
F	Louisiana National Bank	2001 N Trenton St, Ruston, LA 71270	Tue 5/16/2023	07:15-08:15	16:45-17:45	07:15-08:15	16:45-17:45

Table 43 presents the estimated peak hour trip rates for the drive-thru bank sites compared to the ITE trip rates. Across the four time periods shown in the table, the estimated rates vary across sites, with some falling below and others exceeding the ITE average. The estimated rates for all sites exceed the ITE minimum. All sites have estimated rates lower than the ITE maximum trip rate, except for Site E during the morning peak hours.

Table 42. Peak hour trip rates for the drive-thru bank sites

Time period	Estimated rate (trips per hour per 1,000 sq. ft. GFA)						ITE trip rate		
	Site A	Site B	Site C	Site D	Site E	Site F	Average	Minimum	Maximum
Weekday morning peak hour of adjacent road	N/A	N/A	1.5	N/A	17.6	N/A	(5.77) 4.18	(1.23) 0.89	(17.09) 12.38
Weekday morning peak hour of generator	(8.3)	7.6	14.1	(4.0)	30.0	2.5	(7.88) 6.98	(1.97) 1.74	(24.93) 22.10
Weekday evening peak hour of adjacent road	(5.1)	6.0	6.4	2.5)	29.5	3.4	(10.52) 10.52	(1.52) 1.52	(54.96) 54.96
Weekday evening peak hour of generator	(8.2)	7.4	16.3	(4.2)	33.1	3.4	(10.46) 10.46	(2.27) 2.27	(34.25) 34.25

* N/A: No trips during the morning peak hour of the adjacent road of the site* (Entering Rate)

Drive-Thru Daiquiri/Boil Shop Sites

Introduction

Five drive-thru daiquiri shops (Sites A to E), two drive-thru boil shops (Sites F and G), and one drive-thru daiquiri/boil shop (Site H) were selected from Districts 61, 62, and 05. Table 44 shows the information for the eight sites, along with the accuracy of entering and exiting counts at each site.

Table 43. Site details and accuracy of entering and exiting trip rates for the selected five drive-thru daiquiri shop sites (A to E), two drive-thru boil shop sites (F and G), and one drive-thru daiquiri/boil shop site (H)

Week	Site no.	Name	District	Area (sq. ft.)	Data collection	Entering accuracy %	Exiting accuracy %	Adjustment factor	Monitoring time
18	16 (A)	New Orleans Original Daiquiris, Gonzales	61	2115	YOLO	94	N/A *	1.06	10:30 a.m. until 8:30 p.m.
11	17 (B)	Swamp Shack Daiquiri	61	1400	Micro-Radar	115	98	1.02	1:00 p.m. until 9:00 p.m.
6	9 (C)	New Orleans Original Daiquiris, Covington	62	3000	Micro-Radar	100	N/A *	1.00	10:30 a.m. until 9:00 p.m.
7	10 (D)	Wacky Daiquiri	62	1100	Micro-Radar	104	N/A *	0.96	11:30 a.m. until 8:30 p.m.
23	36 (E)	Bayou Butts and Booze	05	2900	YOLO	109	98	1.02	8:45 a.m. until 8:15 p.m.
1	1 (F)	La Boilers	61	2400	Micro-Radar	109	133	0.92	9:30 a.m. until 9:00 p.m.
22	35 (G)	Ron's Seafood Market	62	1500	YOLO	110	102	0.98	9:45 a.m. until 8:15 p.m.
16	25 (H)	Bayou Boil N Geaux	62	1000	YOLO	100	100	1.00	10:30 a.m. until 7:30 p.m.

N/A *: Not available, as the camera/radar was not able to capture the trip counts from that side

These two land use types are unique to Louisiana; there is no land use in the ITE Trip Generation Manual that corresponds to these two land use types. The nearest possible land use is Land Use 934–Fast-Food Restaurant with Drive-Through Window. The description for this land use is: "…any fast-food restaurant with a drive-through window. This type of restaurant is characterized by a large drive-through and large carry-out clientele, long hours of service (some are open for breakfast, all are open for lunch and dinner, some are open late at night or 24 hours a day) and high turnover rates for eat-in customers. The restaurant does not provide table service." The trip rates for this land use type are high, with an average daily trip rate of 467.48 trips per 1,000 square feet and a minimum of 98.89 trips. These rates are much higher than the drive-thru establishments in Louisiana.

One objective of including drive-thru daiquiri and drive-thru boil shop sites was to see whether both could be grouped under the same category. However, after analyzing and comparing the trip rates and examining the effects of contextual factors for each, it was found that they should be treated as separate land use types. This is consistent with the ITE Manual, which differentiates between shops selling food and those selling drinks. The detailed results are explained in the following sections of the report. Part 1 presents the analysis for the five drive-thru daiquiri shop sites (A to E), while Part 2 covers the two drive-thru boil shop sites (F and G) and one drive-thru daiquiri/boil shop site (H).

Part 1: Drive-Thru Daiquiri Shop Sites

Table 45 presents the daily vehicle trip rates for the selected five drive-thru daiquiri shop sites across five weekdays. The CV across the five weekdays for each site ranged between 15 and 52% and averaged 36%, indicating high variability. The CV across the sites for each weekday ranged between 41 and 70%, averaging 62%, indicating very high variability.

Table 44. Trip rates and statistics for the drive-thru daiquiri shop sites

Daily trips per 1,000 sq. ft.	**District 61**		**District 62**		**District 05**	**Mean**	**Maximum**	**Minimum**	**Variance**	**Standard deviation**	***Coeff. of variation (CV) %***
	Site A	**Site B**	**Site C**	**Site D**	**Site E**						
Monday	39.1	Closed	15.7	34.0	… *	29.6	39.1	15.7	152.0	12.3	***41.6***
Tuesday	54.6	43.7	16.0	35.8	94.6	48.9	94.6	16.0	851.0	29.2	***59.6***
Wednesday	57.6	42.3	13.7	32.3	88.6	46.9	88.6	13.7	799.1	28.3	***60.3***
Thursday	75.2	51.7	14.0	22.7	105.5	53.8	105.5	14.0	1421.9	37.7	***70.1***
Friday	118.3	109.3	28.0	36.7	124.2	83.3	124.2	28.0	2200.5	46.9	***56.3***
Mean	69.0	61.7	17.5	32.3	103.2	54.5			1112.7	33.4	***61.7***
Maximum	118.3	109.3	28.0	36.7	124.2						
Minimum	39.1	42.3	13.7	22.7	88.6						
Variance	924.2	1021.8	35.7	31.6	243.5	379.3					
Standard deviation	30.4	32.0	6.0	5.6	15.6	19.5					
Coeff. of variation (CV) %	***44.1***	***51.8***	***34.2***	***17.4***	***15.1***	***35.7***					

…* The recording of that day was missed.

Among the five drive-thru daiquiri shop sites, Site E recorded the highest mean trip rate, averaging 103.2, peaking at 124.2 on Friday. In contrast, Site C exhibited the lowest mean trip rate at 17.5, with a minimum of 13.7 observed on Wednesday and a maximum of 28.0 observed on Friday. Across all sites and weekdays, the overall average trip rate was 54.5. Table 46 summarizes the contextual characteristics of each site.

Table 45. Contextual factor levels for drive-thru daiquiri shop sites in Districts 61, 62, and 05

Sites	**AADT level**	**Population density level**	**Jobs per worker level**
Site A	Low	High	High
Site B	High	Low	High
Site C	Low	Low	High
Site D	Low	Low	Low
Site E	High	Low	High

Figure 31, Figure 32, and Figure 33 present the daily vehicle trip rates for the five drive-thru daiquiri shop sites by District. The two drive-thru daiquiri shops in each of Districts 61 and 62 show a pattern in trip rates across weekdays. Given that one site is only available in District 05, the five sites were all included in the LMM to investigate the effect of contextual factors on trip rates without grouping them by District.

Figure 31. Daily vehicle trip rates for the drive-thru daiquiri shop sites in District 61

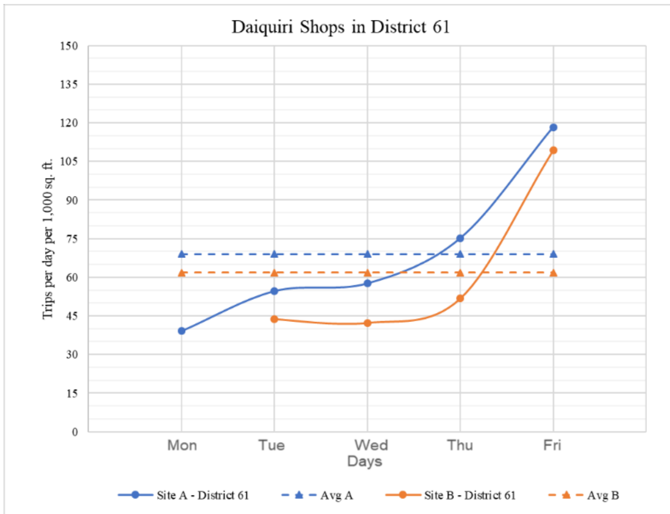


Figure 32. Daily vehicle trip rates for the drive-thru daiquiri shop sites in District 62

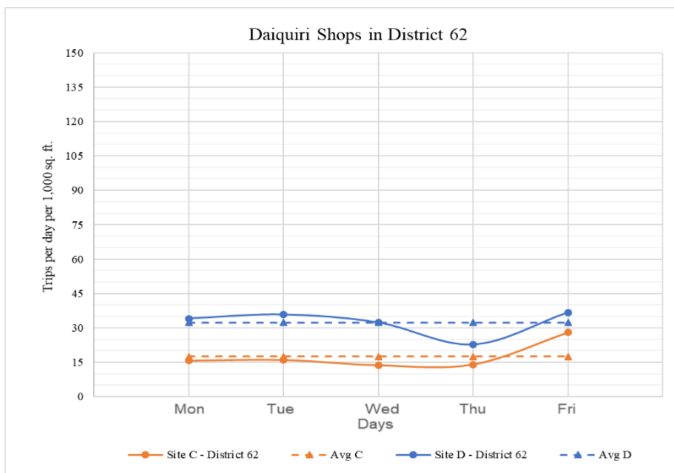
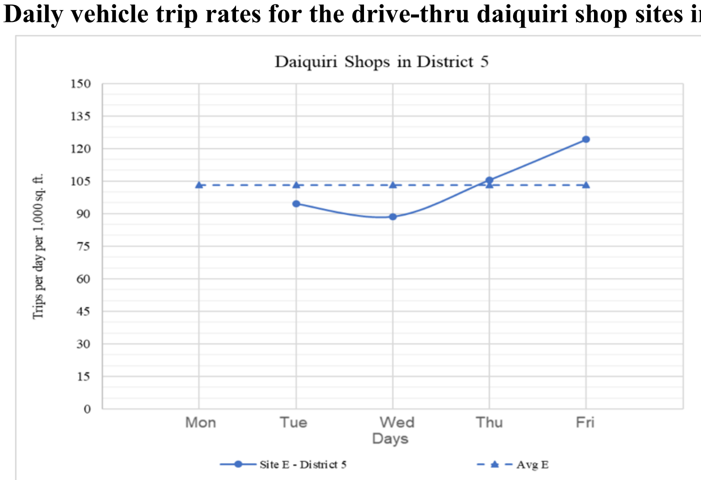


Figure 33. Daily vehicle trip rates for the drive-thru daiquiri shop sites in District 05



Districts

In District 61, Site A recorded a mean trip rate of 69.0, with a peak of 118.3 on Friday and a minimum of 39.1 on Monday. Site B had a lower mean of 61.7, ranging from 42.3 on Wednesday to a maximum of 109.3 on Friday. Site A showed a CV of 44.1%, slightly lower than Site B at 51.8%, both of which indicate high variability by day of the week.

In District 62, Site C had a mean trip rate of 17.5, with a minimum of 13.7 on Wednesday and a maximum of 28.0 on Friday. Site D showed a mean of 32.3, ranging from 22.7 on Thursday to 36.7 on Friday. The CV for Site C was 34.2%, compared to 17.4% for Site D.

In District 05, Site E recorded the highest mean trip rate of 103.2, peaking at 124.2 on Friday and dropping to 88.6 on Wednesday. The CV for Site E was 15.1%, indicating relatively low variability compared to the sites in Districts 61 and 62. Overall, the highest daily trip rates across all five sites were consistently observed on Friday, showing typical peak activity patterns.

Table 47 shows the results of the LMM and indicates that the baseline daily trip rate, when all categorical variables are set to the reference level (high), is 128.4. The coefficients for the AADT level and population density level are statistically significant ($p < 0.001$), suggesting that traffic volume on the adjacent road for these sites and the population density of the tracts where the sites are located affect trip rates at the drive-thru daiquiri shop sites. In contrast, the jobs per worker factor was statistically insignificant, with a positive coefficient ($\beta = 16.16$, $p = 0.19$).

Table 46. LMM results for drive-thru daiquiri shop sites investigating the effect of contextual factors on weekday trip rates

Predictor	Coef. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	128.44	5.15	24.955	<0.001	[118.36, 138.53]
x_i	-63.38	10.26	-6.177	<0.001	[-83.49, -43.27]
z_i	-47.58	6.64	-7.169	<0.001	[-60.59, -34.57]
y_i	16.16	12.39	1.304	0.192	[-8.12, 40.44]
Weekday Var	276.91				
No. of observations (Days): 24					
$R^2 = 0.91$					

- x_i is the indicator variable with value 1 if AADT level at the i^{th} site is low and 0 otherwise
- z_i is the indicator variable with value 1 if population density level at the i^{th} site is low and 0 otherwise
- y_i is the indicator variable with value 1 if jobs per worker level at the i^{th} site is low and 0 otherwise

These results suggest that drive-thru daiquiri shop sites located on roads with higher AADT and in higher-density tracts generated more trips than those on lower-AADT roads and in lower-density areas. Overall, these findings highlight that traffic and socioeconomic factors significantly influence trip rates at drive-thru daiquiri shops.

Part 2: Drive-Thru Boil Shop and Drive-Thru Daiquiri/Boil Shop Sites

Table 48 presents the daily vehicle trip rates for two drive-thru boil shop sites and one drive-thru daiquiri/boil shop site across five weekdays. The CVs over the week show moderate to high variability across days, while the CVs over the sites show very high variability between sites on all days. While Site H, which offers both services, has a markedly higher trip rate on Friday than the other two sites, its rates are otherwise not much different from Site G. Sites A and B also showed the same pattern as Site H, with a peak rate on Friday that was much higher than the rest of the week.

Table 47. Trip rates and statistics for the two drive-thru boil shop sites (F and G) and the drive-thru daiquiri/boil shop site (H)

Daily trips per 1,000 sq. ft.	District 61	District 62		Mean	Maximum	Minimum	Variance	Standard deviation	*Coeff. of variation (CV) %*
	Site F	Site G	Site H						
Monday	16.5	69.9	*	43.2	69.9	16.5	1427.0	37.8	***87.5***
Tuesday	12.7	51.6	81.0	48.4	81.0	12.7	1175.6	34.3	***70.8***
Wednesday	16.1	52.9	69.0	46.0	69.0	16.1	735.4	27.1	***58.9***
Thursday	15.3	71.2	67.0	51.2	71.2	15.3	968.3	31.1	***60.8***
Friday	23.0	89.5	142.0	84.8	142.0	23.0	3556.6	59.6	***70.3***
Mean	16.7	67.0	89.8	55.6			1397.1	37.4	***67.3***
Maximum	23.0	89.5	142.0						
Minimum	12.7	51.6	67.0						
Variance	14.6	241.9	1251.6	292.0					
Standard deviation	3.8	15.6	35.4	17.1					
Coeff. of variation (CV) %	***22.9***	***23.2***	***39.4***	***30.8***					

* This shop is closed on Mondays

Figure 34 and Figure 35 present the daily vehicle trip rates for the two drive-thru boil shop sites and for the drive-thru daiquiri/boil shop site, respectively**.** The two drive-thru boil shop sites were included in the LMM to investigate the effect of contextual factors on trip rates.

Figure 34. Daily vehicle trip rates for the drive-thru boil shop sites in District 61 and District 62

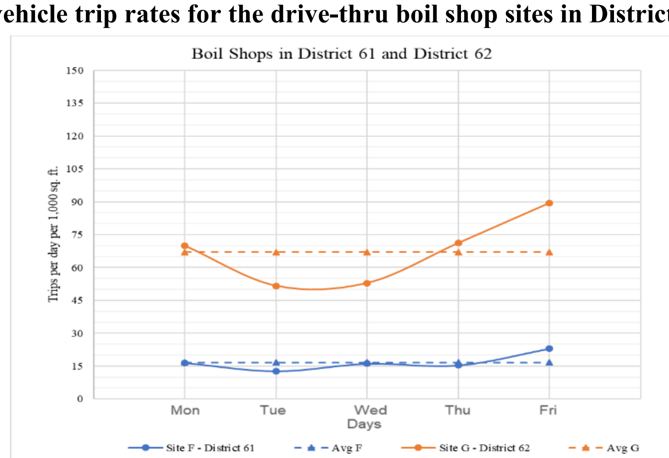


Figure 35. Daily vehicle trip rates for the drive-thru daiquiri/boil shop site in District 62

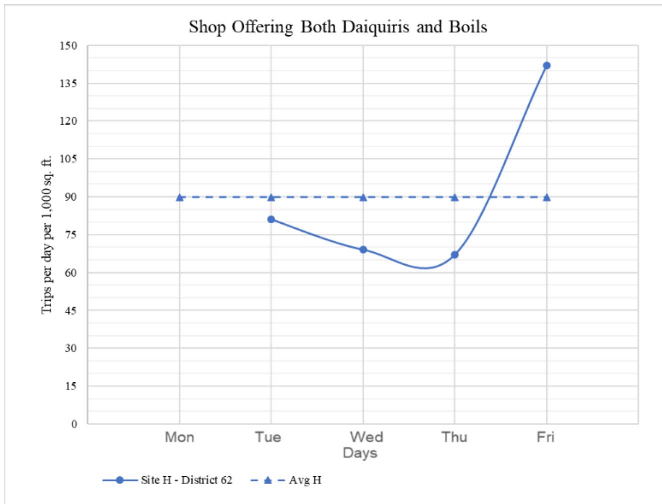


Table 49 shows the average trip rates for the two drive-thru boil shop sites. Table 50 summarizes the contextual characteristics of each site.

Table 48. Trip rates for the drive-thru boil shop sites in Districts 61 and 62

	Site F	*Site G*
Estimated Average Trip Rate	16.7	67.0

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Table 49. Contextual factor levels for two drive-thru boil shop sites (F and G) and the drive-thru daiquiri/boil shop site (H)

Sites	AADT level	Population density level	Jobs per worker level
Site F	High	High	Low
Site G	High	High	High
Site H	Low	High	High

Sites

Site F recorded a mean trip rate of 16.7, with a peak of 23.0 on Friday and a minimum of 12.7 on Tuesday. Site G had a higher mean of 67.0, ranging from 51.6 on Tuesday to a maximum of 89.5 on Friday. Site H showed the highest mean trip rate of 89.8, with a peak of 142.0 on Friday and a minimum of 67.0 on Thursday. Site F had a CV of 22.9%, similar to Site G at 23.2%. Overall, the highest daily trip rates across all three sites were observed on Friday, consistent with typical peak activity at the drive-thru daiquiri shop sites. Table 51 shows the results of the LMM and indicates that the baseline trip rate, when all categorical variables are set to the reference level (high), is 68.4. The AADT level and population density level for the two drive-thru boil shop sites are the same, so no comparison could be made for these two contextual factors. The coefficient for jobs per worker ratio is statistically significant ($p < 0.001$), suggesting that the jobs per worker ratios of the tracts where the sites are located affect trip rates at the drive-thru boil shop sites.

Table 50. LMM results for the two drive-thru boil shop sites and the drive-thru daiquiri/boil shop site

Predictor	Coef. (β)	Standard error	z-value	p-value	95% CI
(Intercept)	68.40	4.81	14.220	<0.001	[58.97, 77.83]
y_i	-50.22	6.73	-7.457	<0.001	[-63.42, -37.02]
Weekday Var	67.10				
No. of observations (Days): 10					
$R^2 = 0.96$ • y_i is the indicator variable with value 1 if jobs/worker level at the i^{th} site is low and 0 otherwise					

The negative sign of the jobs per worker coefficient suggests that drive-thru boil shops in tracts with higher jobs per worker ratios were associated with higher trip rates. This outcome suggests that people are more likely to visit drive-thru boil shops near their workplace rather than near their residence, which is different from the outcome for the drive-thru daiquiri shop sites. Overall, these findings highlight that socioeconomic factors significantly influence trip rates at drive-thru boil shops. The drive-thru boil shops warrant further research, as these results are based on only two sites.

Analysis of Peak Hour Trip Rates

Table 52 presents the details for each drive-thru daiquiri and/or drive-thru boil shop site, including the reported morning and evening peak hours from MS2 and the highest one-hour volume within the ITE-defined peak hour periods.

Table 51. MS2 morning and evening peak hours vs. highest one-hour volumes from ITE-defined ranges on adjacent roads of selected drive-thru daiquiri shop and/or drive-thru boil shop sites

Sites	Site name	Address	Recent volume data date	MS2 morning peak hour	MS2 evening peak hour	Highest one-hour volume within 07:00-09:00	Highest one-hour volume within 16:00-18:00
A	New Orleans Original Daiquiri, Gonzales	1810 Louisiana 30 W, Gonzales, LA 70737	Wed 9/14/2022	11:30-12:30	16:30-17:30	07:00-08:00	16:30-17:30
B	Swamp Shack Daiquiri	812 N Lobdell Hwy, Port Allen, LA 70767	Mon 6/30/2025	06:45-07:45	15:45-16:45	07:00-08:00	16:00-17:00
C	New Orleans Original Daiquiris, Covington	2700 N Hwy 190, Covington, LA 70433	Wed 9/18/2024	07:15-08:15	15:15-16:15	07:15-08:15	16:00-17:00
D	Wacky Daiquiri	82004 LA25, Folsom, LA 70437	Wed 1/24/2024	07:30-08:30	16:30-17:30	07:30-08:30	16:30-17:30
E	Bayou Butts and Booze	600 Thomas Rd, West Monroe, LA 71292	Tue 3/11/2025	10:45-11:45	14:30-15:30	08:00-09:00	16:00-17:00
F	La Boilers	2741 O'Neal Ln, Baton Rouge, LA 70816	Tue 7/11/2023	07:30-08:30	17:15-18:15	07:30-08:30	17:00-18:00
G	Ron's Seafood Market	1160 S Range Ave, Denham Springs, LA 70726	Wed 7/25/2018	11:30-12:30	16:15-17:15	08:00-09:00	16:15-17:15
H	Bayou Boil N Geaux	1512 N Hwy 190, Covington, LA 70433	Tue 2/6/2024	07:15-08:15	16:45-17:45	07:15-08:15	16:45-17:45

Table 53 shows the estimated peak hour trip rates for the drive-thru daiquiri shop and/or drive-thru boil shop sites. Because these two land use types are unique to the state of Louisiana, there are no available trip rates in the ITE for comparison. Although the two land use types are not included in the ITE, we continued calculating the weekday morning and evening peak hour trip rates during the highest one-hour volume of the morning interval (7:00–9:00) and the evening interval (16:00–18:00), as defined by the ITE for other land uses. This allows the results to be presented in the same style as the ITE and enables comparison between sites.

Table 52. Peak hour trip rates for the drive-thru daiquiri shop and/or drive-thru boil shop sites

Time period	Estimated rate per 1,000 sq. ft. of Gross Floor Area (GFA)							
	Site A	**Site B**	**Site C**	**Site D**	**Site E**	**Site F**	**Site G**	**Site H**
Weekday morning peak hour of adjacent road	* N/A	* N/A	* N/A	* N/A	* N/A	* N/A	* N/A	* N/A
Weekday morning peak hour of generator	1.6	* N/A	1.8	1.9	7.5	1.4	5.4	5.7
Weekday evening peak hour of adjacent road	10.3	6.6	0.9	5.9	13.6	1.8	8.0	16.5
Weekday evening peak hour of generator	14.9	10.8	3.2	8.6	14.4	2.8	12.2	16.8

* N/A: No available trips during the morning peak hour of the adjacent road of the site

Task 8: Compare the Counted Rates with Third-Party Data

Introduction

Trip counts are a fundamental component of calculating trip rates. Traditionally, trip rates have been obtained through manual traffic counts, video-based monitoring, or other field survey methods. However, these approaches are time-consuming, costly, and labor-intensive. In recent years, advances in computer vision, big data analytics, and mobile technology have introduced alternative data sources for estimating travel activity. Third-party mobility datasets, such as cell phone location data, can help estimate trip counts at a larger scale and at lower cost. This study investigated the potential of using cell phone location data to estimate trip rates across different land uses. The primary objective was to evaluate the potential of using mobility data from cell phone location records to estimate trip rates for different land use types, compared with actual site-specific count data, and to determine whether such data can be used reliably in trip rate studies. At the time this work was performed, only daily counts were available.

Data Collection

The mobility data used in this study were derived from location data collected through approximately 1,000 mobile applications, resulting in over 300 billion monthly data points and an average of more than 100 observations per cell phone per day. Cell phone location data have mapped approximately 150 million Points of Interest (POIs) in the U.S., with over 7 million manually reviewed to ensure accuracy. The data are available for five of the six land use types.

Mobility data of this type are not available for apartment complexes, as they are not counted as public areas and raise confidentiality concerns.

Data for the study sites were extracted from the provider's Application Programming Interface (API) and converted into Microsoft Excel files. These files were filtered to include only the sites relevant to this project that had available mobility data. The extracted data included:

- Raw Visit Counts—representing the total number of detected visits to each site based on cell phone location.
- Normalized Visits by State Scaling—adjusted visit counts calculated by the provider using their estimation methodology, details of which were not disclosed.

Given that the number of pedestrians and cyclists at the studied locations was negligible, the visit counts were assumed to represent vehicle counts. This assumption enabled a direct comparison between mobility data and site-based vehicular counts.

Mobility Data Analysis for Dollar Store Sites

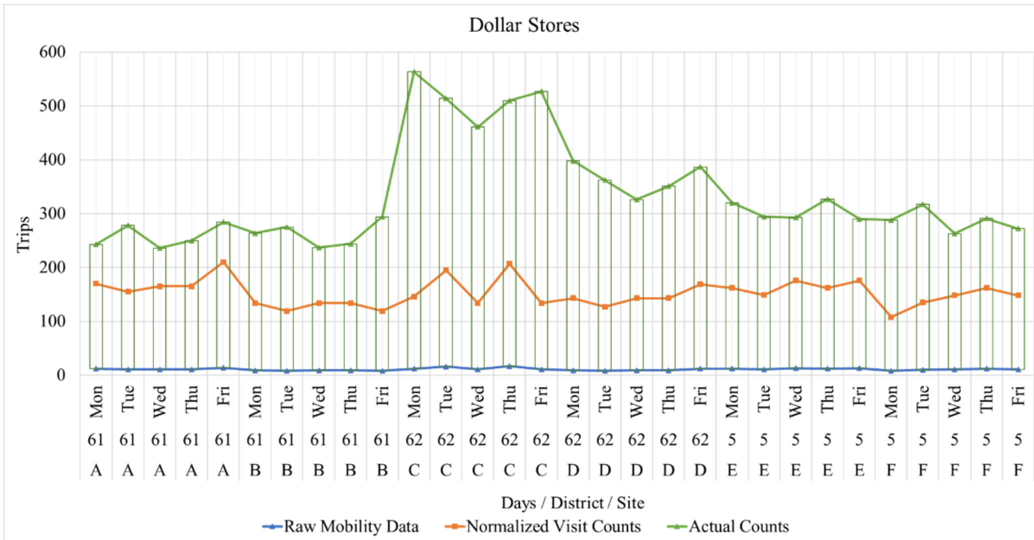
Comparison Between Normalized Mobility Counts and Actual Trip Counts for Dollar Store Sites

Mobility data were obtained and processed for the six dollar store sites under investigation in this study. Table 54 presents the daily comparison between the normalized visit counts provided by the mobility data source and the actual counts recorded at the six dollar store sites. The normalized counts were scaled using the provider's state-level adjustment methodology. Across all days, the normalized counts substantially underestimated the actual visit counts, with accuracy percentages ranging from 25 to 74%. No data point met the "acceptable" threshold of between 90 and 110%. Figure 36 visually confirms this consistent underestimation, indicating that the provider's normalization methodology does not align with actual trip counts at the dollar store sites under investigation in this study.

Table 53. Comparison between normalized mobility data counts and actual counts for dollar store sites

Dollar store site	Days	Raw counts from mobility data	Normalized counts from mobility data	Actual counts	Percent accuracy	Acceptable? (Y/N)
Site A	Mon	12	170	243	70	N
	Tue	11	155	278	56	N
	Wed	11	165	236	70	N
	Thu	11	165	250	66	N
	Fri	14	210	284	74	N
Site B	Mon	9	134	264	51	N
	Tue	8	119	275	43	N
	Wed	9	134	237	57	N
	Thu	9	134	244	55	N
	Fri	8	119	294	40	N
Site C	Mon	12	146	563	26	N
	Tue	16	195	514	38	N
	Wed	11	134	461	29	N
	Thu	17	207	510	41	N
	Fri	11	134	527	25	N
Site D	Mon	9	143	398	36	N
	Tue	8	127	362	35	N
	Wed	9	143	326	44	N
	Thu	9	143	351	41	N
	Fri	12	169	387	44	N
Site E	Mon	12	162	320	51	N
	Tue	11	149	294	51	N
	Wed	13	176	293	60	N
	Thu	12	162	327	50	N
	Fri	13	176	290	61	N
Site F	Mon	8	108	288	38	N
	Tue	10	135	317	43	N
	Wed	11	148	263	56	N
	Thu	12	162	291	56	N
	Fri	11	148	272	54	N

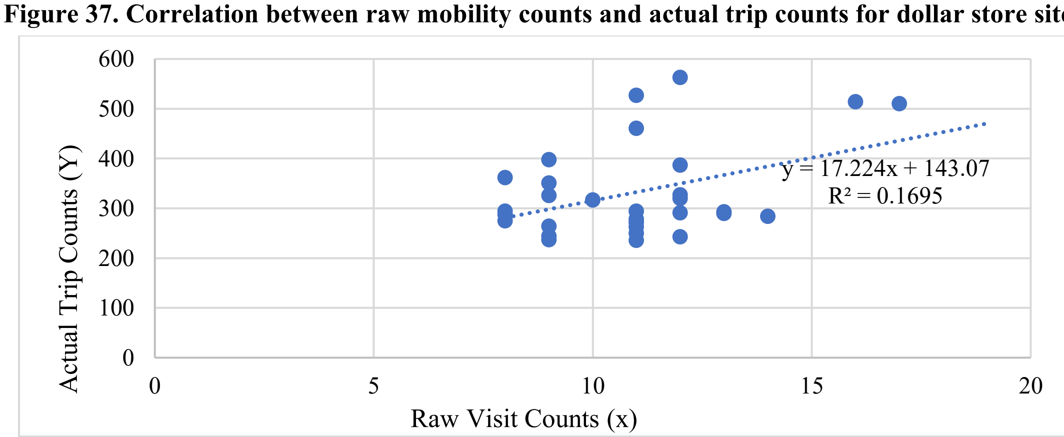
Figure 36. Visual comparison between normalized mobility data counts and actual trip counts for dollar store sites



Correlation Between Raw Mobility Counts and Actual Trip Counts for Dollar Stores Sites

Table 54 presents the daily raw mobility counts and the actual trip counts of the six dollar stores sites. To assess the correlation between normalized visit counts and actual trip counts, the R^2 was calculated, resulting in a value of 0.03 ($F=9.03$, $p=0.01$), which quantifies the strength of the relationship between the two variables. To assess whether unscaled mobility data might provide better alignment with observed trips, raw visit counts were compared with the actual trip counts. The scatter plot in Figure 37 shows the relationship, with an R^2 value of 0.17 ($F=17.36$, $p=0.0003$), indicating a weak linear correlation between raw mobility counts and actual trip counts.

Figure 37. Correlation between raw mobility counts and actual trip counts for dollar store sites



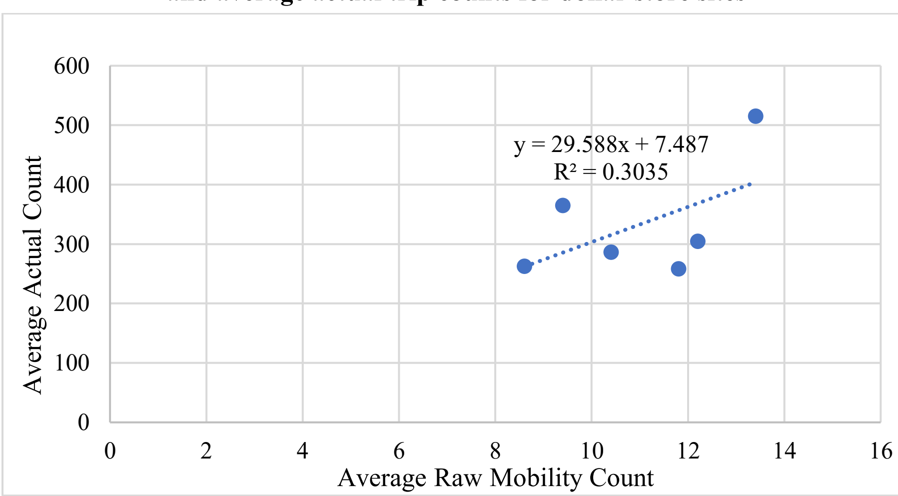
Correlation Between Average Raw Mobility Counts and Average Actual Counts for Dollar Store Sites

The correlation analysis was repeated using site-level averages to reduce day-to-day variability. The resulting comparison is presented in Table 55 and Figure 38. The R^2 value increased from 0.17 (F=17.36, p=0.0003) to 0.30 (F=1.74, p=0.26), indicating a moderate improvement in correlation when averaging counts over multiple days, but a loss of significance of the F statistic. Averaging reduces noise and improves the relationship between mobility counts and actual trip counts, but the correlation remains insufficient for direct application of estimating trip rates without additional calibration.

Table 54. Comparison between average raw mobility counts and average actual trip counts for dollar store sites

Site	Average raw mobility counts	Average actual counts
A	11.8	258.2
B	8.6	262.8
C	13.4	515.0
D	9.4	364.8
E	12.2	304.8
F	10.4	286.2

Figure 38. Correlation between average raw mobility counts and average actual trip counts for dollar store sites



Summary of Findings of Mobility Data Analysis for Dollar Store Sites

The findings of analyzing mobility data for dollar store sites demonstrate that:

1. Normalized mobility counts underestimate actual counts at the studied dollar store sites.
2. Raw mobility counts have a weak correlation with observed counts ($R^2 = 0.17$) (F=17.36, p=0.0003), and although site averages improve the relationship ($R^2 = 0.30$) (F=1.74, p=0.26), the correlation remains low.

3. The low R^2 values suggest that the current scaling method used by a third-party mobility data provider is not suitable for directly estimating trip rates for dollar store sites.

The results indicate that the R^2 between the averaged raw mobility data and the actual trip rates of dollar stores is 0.30, which is insufficient to serve as a single estimator of the actual trip rates and is also not statistically significant. Therefore, there is no evidence that these third-party mobility data are potentially useful.

Mobility Data Analysis for Urgent Care Sites

Comparison Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Urgent Care Sites

Out of the six urgent care sites under investigation in this study, mobility data were obtained and processed for the four sites. Table 56 presents the daily comparison between the normalized visit counts provided by the mobility data source and the actual counts recorded at the four urgent care sites. Unlike the dollar store sites, the normalized counts overestimated the actual counts across all days, except for Site B on Friday. The accuracy percentage ranges from 59 to 562%. No data point met the "acceptable" threshold of between 90 and 110%. Figure 39 visually confirms this consistent overestimation, indicating that the provider's normalization methodology of mobility data does not align with actual trip counts at the urgent care sites under investigation in this study. Site B in District 61 has the same pattern between the normalized visit counts and the actual data.

Table 55. Comparison between raw mobility counts, normalized mobility counts, and actual counts for urgent care sites

Urgent care sites	Days	Raw counts from mobility data	Normalized counts from mobility data	Actual counts	Percent accuracy	Acceptable? (Y/N)
Site B	Mon	4	57	39	146	N
	Tue	3	43	34	126	N
	Wed	4	57	46	124	N
	Thu	4	57	51	112	N
	Fri	2	29	49	59	N
Site C	Mon	19	222	68	326	N
	Tue	17	199	95	209	N
	Wed	22	257	67	384	N
	Thu	22	257	61	421	N
	Fri	24	281	50	562	N
Site D	Mon	7	115	42	274	N
	Tue	7	115	37	311	N
	Wed	7	115	40	288	N
	Thu	8	112	49	229	N
	Fri	8	112	42	267	N
Site F	Tue	7	99	70	141	N
	Wed	7	99	65	152	N
	Thu	7	99	55	180	N
	Fri	6	85	61	139	N

Correlation Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Urgent Care Sites

To assess the correlation between normalized visit counts and actual trip counts, the R^2 was estimated as 0.23 (F=4.95, p=0.04). To evaluate whether unscaled mobility data might better align with observed trips, raw visit counts were compared with actual trip counts. The scatter plot in Figure 40 shows the relationship, with an R^2 value of 0.26 (F=6.01, p=0.03), indicating a weak linear correlation between raw mobility counts and actual trip counts.

Figure 39. Visual comparison between raw mobility data counts, normalized mobility data counts, and actual trip counts for urgent care sites

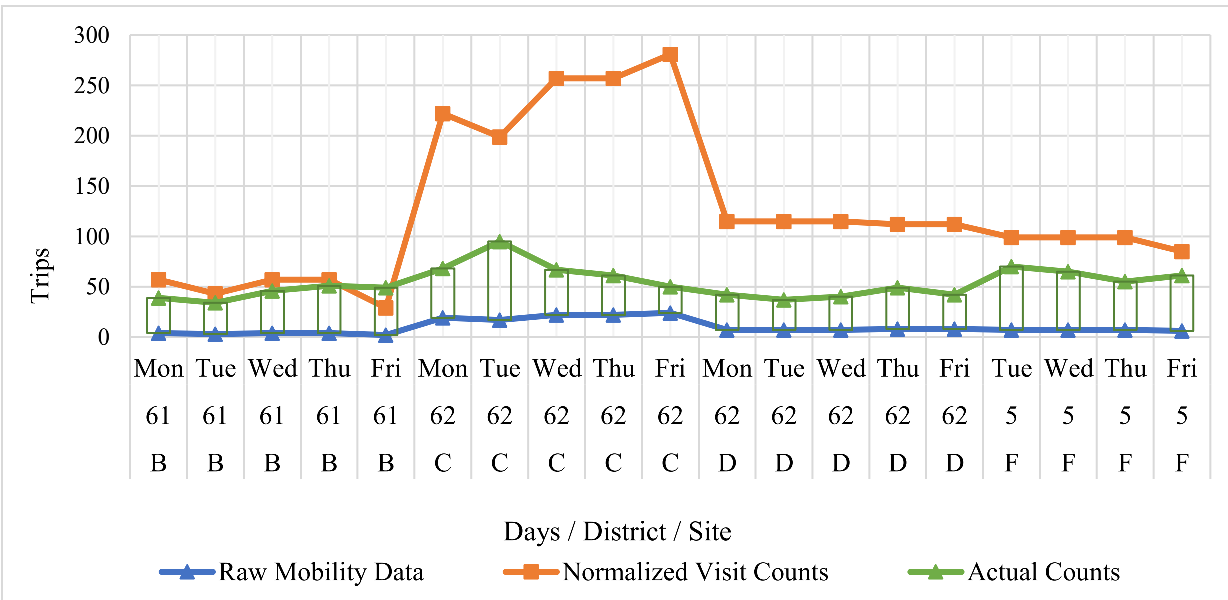
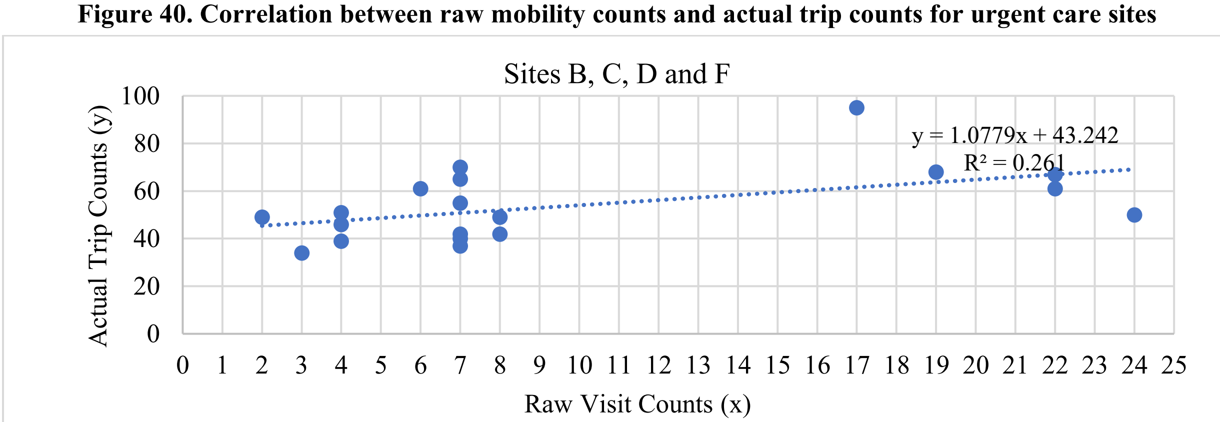


Figure 40. Correlation between raw mobility counts and actual trip counts for urgent care sites



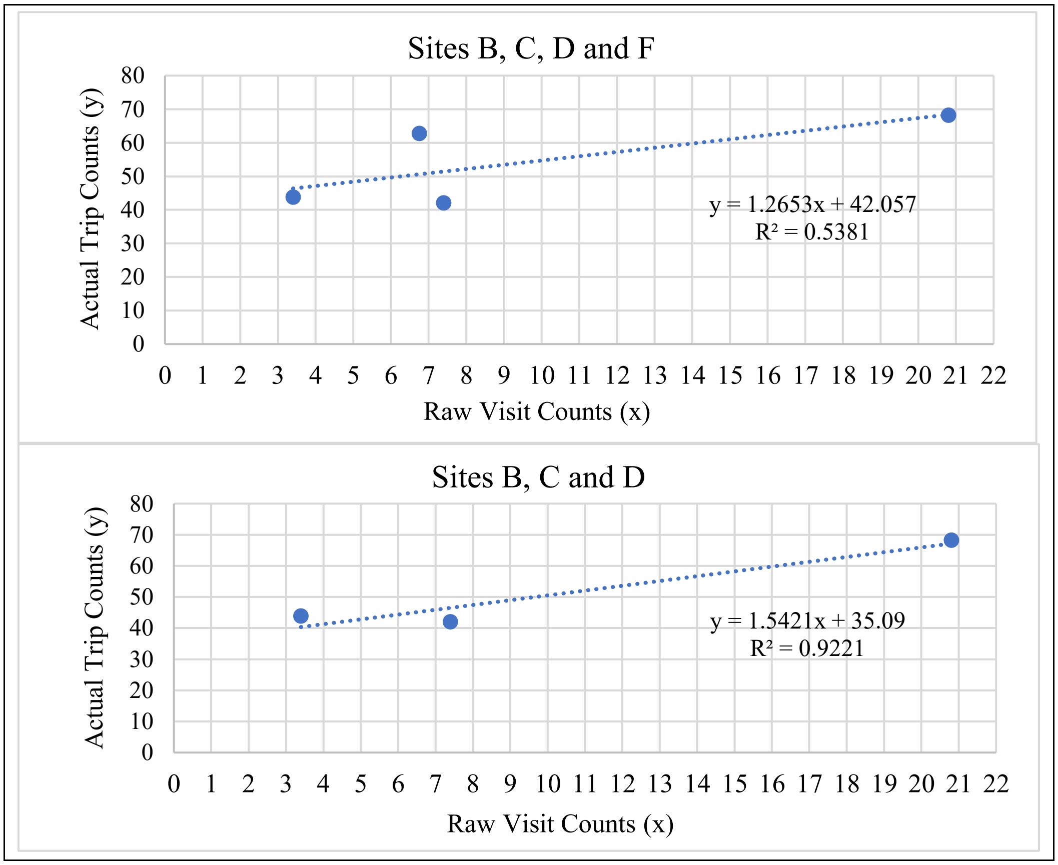
Correlation Between Average Raw Mobility Counts and Average Actual Counts for Urgent Care Sites

The correlation analysis was repeated using site-level averages to reduce day-to-day variability. The resulting comparison is presented in Table 57 and Figure 41. The R^2 value increased from 0.26 (F=6.01, p=0.03) to 0.54 (F=2.33, p=0.27), indicating an improvement in correlation when averaging counts over multiple days, but with a loss of statistical significance. Averaging reduces variation and improves the relationship between mobility counts and actual trip counts, but the correlation remains insufficient for direct application in estimating trip rates without additional variables. Figure 41 shows that if Site F in District 05 is removed, the R^2 value increases from 0.54 to 0.92, indicating a stronger correlation between the average raw mobility data and the average actual trip counts. This change in R^2 suggests that the accuracy of mobility data varies significantly across the sites. Identifying which sites have reliable mobility data and which do not should be addressed in future studies.

Table 56. Comparison between average raw mobility counts and average actual trip counts for urgent care sites

Site	Average raw mobility counts	Average actual trip counts
B	3.4	43.80
C	20.8	68.20
D	7.4	42.00
F	6.75	62.75

Figure 41. Correlation between average raw mobility counts and average actual trip counts for urgent care sites



Summary of Findings of Mobility Data Analysis for Urgent Care Sites

The findings of analyzing mobility data for urgent care sites demonstrate that:

1. Normalized mobility counts overestimate actual counts at the studied urgent care sites.
2. The low R^2 value between normalized visit counts and the actual trip counts (0.23, F=4.95, p=0.04) suggests that the current scaling method used by a third-party mobility data providers is not suitable for directly estimating trip rates for urgent care sites.
3. Raw mobility counts have a weak correlation with observed counts ($R^2 = 0.26$, F=6.01, p=0.03), and site averages improve the relationship to be moderate ($R^2 = 0.54$, F=2.33, p=0.27), but with a loss of significance.
4. Removing the mobility data of Site F increases the R^2 from 0.54 to 0.92, indicating a stronger correlation between average raw mobility and actual trip counts.

The results showed no evidence that these third-party mobility data are useful as a single predictor of actual weekday trip counts. However, when predicting the average trip counts for urgent care sites, the results indicated a moderate correlation.

Mobility Data Analysis for Car Wash Sites

Comparison Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Car Wash Sites

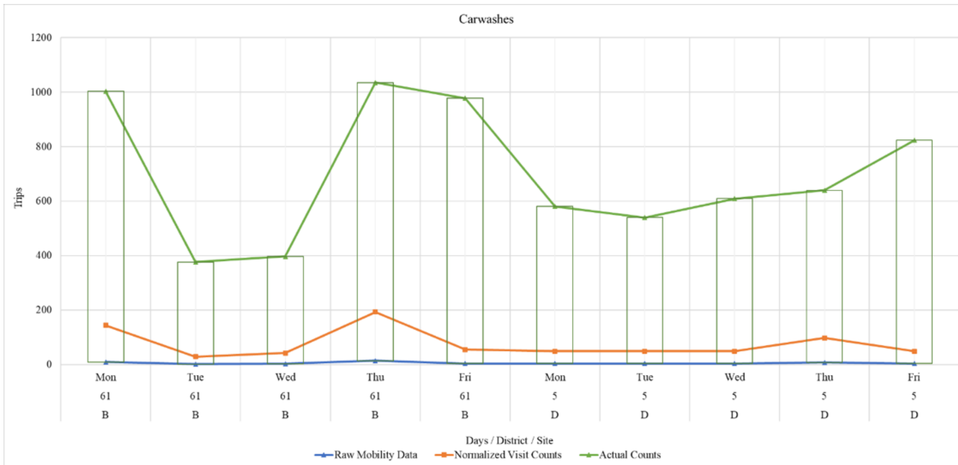
Out of the six car wash sites under investigation in this study, mobility data were obtained and processed for four sites. Only two sites are used in this analysis because the mobility data showed zero counts for two of the four sites during the study period. Table 58 presents the daily comparison between the normalized visit counts provided by the mobility data source and the actual counts recorded at the two car wash sites. The normalized counts were scaled using the provider's state-level adjustment methodology.

The normalized counts underestimated the actual counts on all days. The percentage of accuracy ranges from 6 to 19%. Figure 42 visually confirms that the provider's normalization methodology of mobility data does not align with actual trip counts at the car wash sites under investigation in this study.

Table 57. Comparison between raw mobility counts, normalized mobility counts, and actual counts for the car wash sites

Car wash sites	Days	Raw counts from mobility data	Normalized counts from mobility data	Actual counts	Percent accuracy	Acceptable? (Y/N)
Site B	Mon	10	144	1003	14	N
	Tue	2	29	377	8	N
	Wed	3	43	397	11	N
	Thu	14	193	1035	19	N
	Fri	4	55	978	6	N
Site D	Mon	4	49	581	8	N
	Tue	4	49	540	9	N
	Wed	4	49	609	8	N
	Thu	8	98	640	15	N
	Fri	4	49	823	6	N

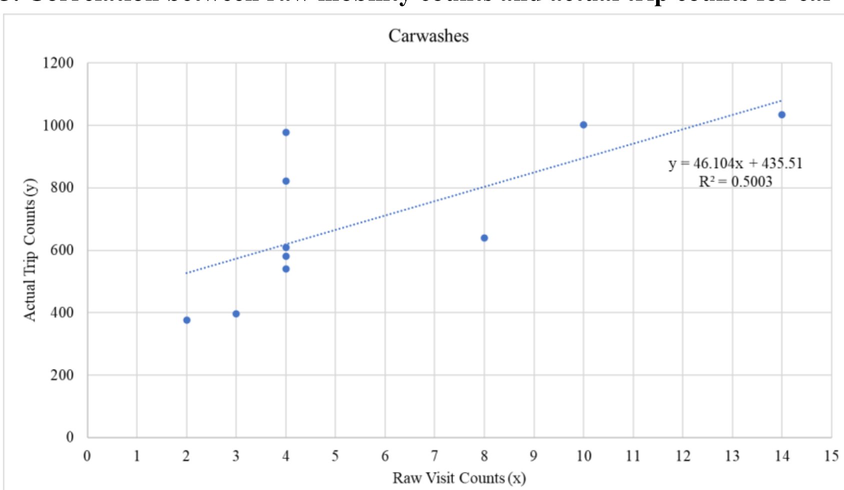
Figure 42. Visual comparison between raw mobility data counts, normalized mobility data counts, and actual trip counts for car wash sites



Correlation Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Car Wash Sites

To assess the correlation between normalized visit counts and actual trip counts, the R^2 was estimated to be 0.51 ($F=8.51$, $p=0.02$), which quantifies the strength of the relationship between the two variables. To evaluate whether unscaled mobility data might better align with observed trips, raw visit counts were compared with actual trip counts. The scatter plot in Figure 43 shows the relationship, with an R^2 value of 0.50 ($F=8.01$, $p=0.02$), indicating a moderate linear correlation between raw mobility counts and actual trip counts.

Figure 43. Correlation between raw mobility counts and actual trip counts for car wash sites



Summary of Findings of Mobility Data Analysis for Car Wash Sites

The findings of analyzing mobility data for car wash sites demonstrate that:

1. The normalized mobility counts consistently underestimate the actual counts.
2. The moderate R^2 value of 0.51 ($F=8.51$, $p=0.02$) between normalized visit counts and the actual trip counts suggests that the current scaling method used by a third-party mobility data providers is not enough for directly estimating trip rates for car wash sites.

The lack of recorded counts at two sites by the mobility data provider, possibly due to poor connection quality at the time, is considered a limitation of these data. The results showed no evidence that these third-party mobility data are useful as a single predictor of actual weekday trip counts.

Mobility Data Analysis for Drive-Thru Bank Sites

Comparison Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Drive-Thru Banks

Out of the six drive-thru bank sites under investigation in this study, mobility data were obtained and processed for three sites. Table 59 presents the daily comparison between the normalized visit counts provided by the mobility data source and the actual counts recorded at the three drive-thru bank sites. As shown in the table, the normalized counts underestimated the actual counts on all days except at Site B, where they overestimated the actual counts on some days (Monday, Tuesday, and Friday). The percentage of accuracy ranges from 35 to 211%. One data point met the “acceptable” threshold of between 90 and 110%. Figure 44 visually confirms that the provider’s normalization methodology of mobility data does not align with actual trip counts at the drive-thru bank sites under investigation in this study.

Table 58. Comparison between raw mobility counts, normalized mobility counts, and actual counts for drive-thru bank sites

Drive-thru bank sites	Days	Raw counts from mobility data	Normalized counts from mobility data	Actual counts	Percent accuracy	Acceptable? (Y/N)
Site A	Mon	13	184	296	62	N
	Tue	12	170	310	55	N
	Wed	12	170	309	55	N
	Thu	13	184	322	57	N
	Fri	12	162	442	37	N
Site B	Mon	25	370	176	210	N
	Tue	23	341	181	188	N
	Wed	9	133	147	90	Y
	Thu	9	133	187	71	N
	Fri	27	400	226	177	N
Site C	Mon	11	172	361	48	N
	Tue	10	165	279	59	N
	Wed	10	165	297	56	N
	Thu	10	165	344	48	N
	Fri	11	172	481	36	N

Correlation Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Drive-Thru Bank Sites

To assess the correlation between normalized visit counts and actual trip counts, the R^2 was 0.17 ($F = 2.58$, $p = 0.13$), indicating a moderate relationship. To evaluate whether unscaled mobility data might better align with observed trips, raw visit counts were compared with actual trip counts. The scatter plot in Figure 45 shows the relationship, with an R^2 value of 0.16 ($F = 2.51$, $p = 0.14$), indicating a weak linear correlation between raw mobility counts and actual trip counts. It is observed that the β_1 coefficient is negative, indicating an inverse relationship between the mobility data counts and the actual counts, which is not theoretically expected. The F-scores show that there is no statistically significant relationship.

Correlation Between Average Raw Mobility Counts and Average Actual Counts for Drive-Thru Bank Sites

The correlation analysis was repeated using site-level averages to reduce day-to-day variability. The resulting comparison is presented in Table 60 and Figure 46. The R^2 value increased from 0.16 ($F = 2.51$, $p = 0.14$) to 0.98 ($F = 45.70$, $p = 0.09$), indicating an improvement in correlation when averaging counts over multiple days. Averaging reduces variation and improves the relationship between mobility counts and actual trip counts, but the correlation remains negative, which is questionable given the expected direction of the association. Also, the F-score remains statistically insignificant.

Figure 44. Visual comparison between raw mobility data counts, normalized mobility data counts, and actual trip counts for drive-thru bank sites

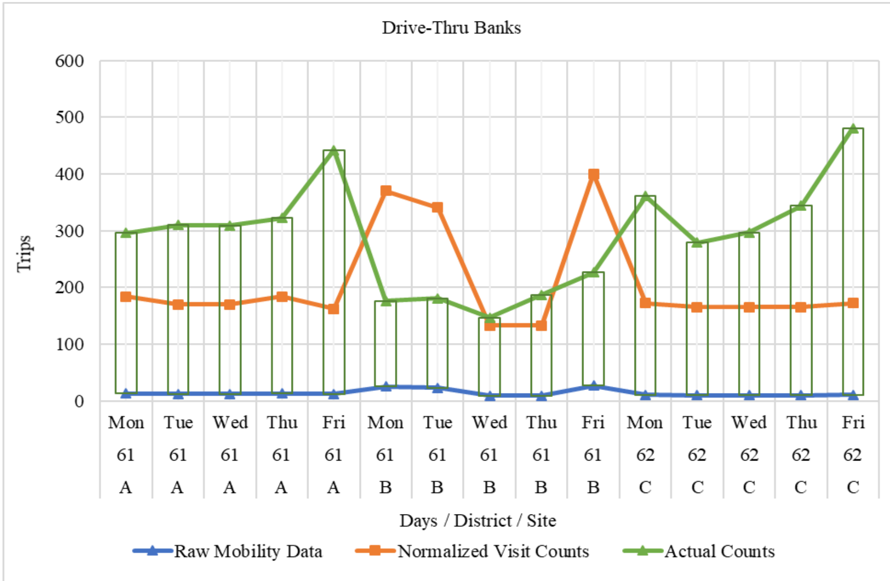


Figure 45. Correlation between raw mobility counts and actual trip counts for drive-thru bank sites

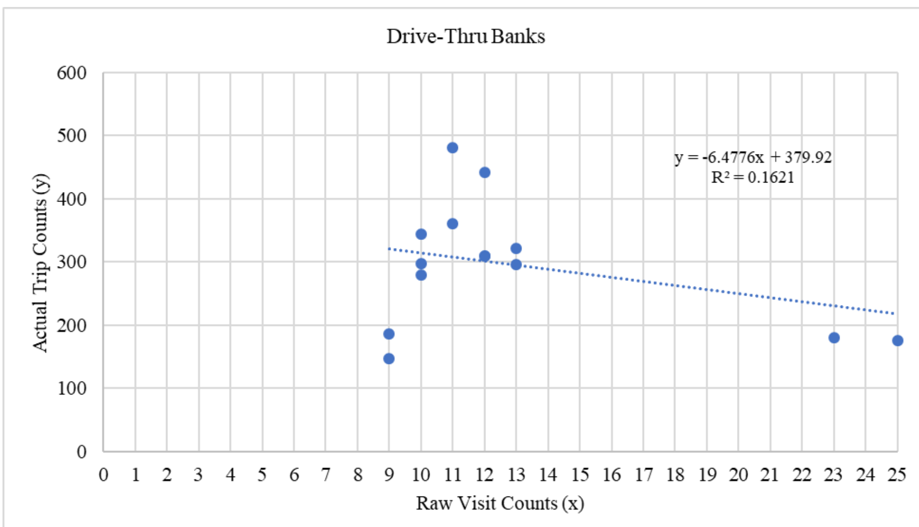
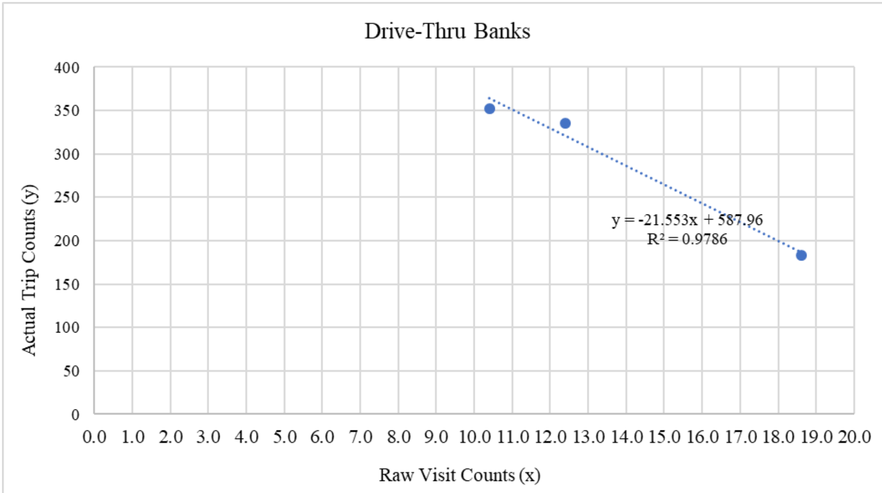


Table 59. Comparison between average raw mobility counts and average actual trip counts for drive-thru bank sites

Site	Average raw mobility counts	Average actual trip counts
A	12.4	335.8
B	18.6	183.4
C	10.4	352.4

Figure 46. Correlation between average raw mobility counts and average actual trip counts for drive-thru bank sites



Summary of Findings of Mobility Data Analysis for Drive-Thru Bank Sites

The findings of analyzing mobility data for drive-thru bank sites demonstrate that:

1. The normalized mobility counts neither consistently overestimate nor underestimate the actual counts.
2. The low R^2 value of 0.17 ($F = 2.58$, $p = 0.13$) between normalized visit counts and the actual trip counts suggests that the current scaling method used by a third-party mobility data provider is not suitable for directly estimating trip rates for drive-thru bank sites.
3. Although averaging the daily counts of the sites improves the correlation between the raw mobility data counts and the actual trip counts ($R^2 = 0.98$, $F = 45.70$, $p = 0.09$), the negative correlation raises concerns about the validity of the mobility data across all sites, and the correlation is still not statistically significant.

The results showed no evidence that these third-party mobility data are useful as a single predictor of actual weekday trip counts.

Mobility Data Analysis for Drive-Thru Daiquiri Shop Sites

Comparison Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Drive-Thru Daiquiri Shop Sites

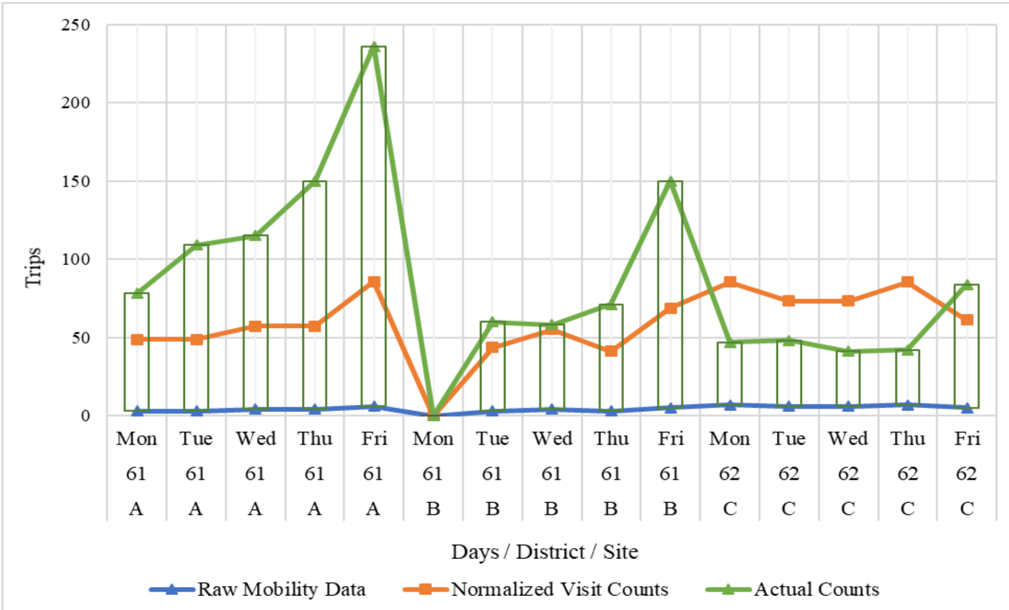
out of the five drive-thru daiquiri shop sites under investigation in this study, mobility data were obtained and processed for three sites. Table 61 presents a daily comparison between the normalized visit counts from the mobility data source and the actual counts recorded at the three drive-thru daiquiri shop sites. The normalized counts were scaled using the provider's state-level adjustment methodology.

As shown in the table, the normalized counts underestimated the actual counts on all days except at Site C, where they overestimated the actual counts on Monday, Tuesday, Wednesday, and Thursday. The percentage of accuracy ranges from 36 to 204%, with only one non-zero data point meeting the "acceptable" threshold of between 90 and 110%. Figure 47 visually confirms that the provider's normalization methodology of mobility data does not align with the actual trip counts at the drive-thru daiquiri shop sites under investigation in this study. However, it is noted that the normalized mobility data exhibits a similar pattern of increase and decrease to the actual data for most days.

Table 60. Comparison between raw mobility counts, normalized mobility counts, and actual counts for drive-thru daiquiri shop sites

Drive-thru daiquiri shop sites	Days	Raw counts from mobility data	Normalized counts from mobility data	Actual counts	Percent accuracy	Acceptable ? (Y/N)
Site A	Mon	3	49	78	62	N
	Tue	3	49	109	45	N
	Wed	4	57	115	50	N
	Thu	4	57	150	38	N
	Fri	6	86	236	36	N
Site B	Mon	0	0	0	100	Y
	Tue	3	44	60	73	N
	Wed	4	55	58	95	Y
	Thu	3	41	71	58	N
	Fri	5	69	150	46	N
Site C	Mon	7	86	47	182	N
	Tue	6	73	48	153	N
	Wed	6	73	41	179	N
	Thu	7	86	42	204	N
	Fri	5	61	84	73	N

Figure 47. Visual comparison between raw mobility data counts, normalized mobility data counts, and actual trip counts for drive-thru daiquiri shop sites



Correlation Between Raw Mobility Counts, Normalized Mobility Counts, and Actual Trip Counts for Drive-Thru Daiquiri Shop Sites

To assess the correlation between normalized visit counts and actual trip counts, the R^2 was 0.14 ($F = 2.08$, $p = 0.17$), indicating a weak relationship. To evaluate whether unscaled mobility data might better align with observed trips, raw visit counts were compared with actual trip counts. The scatter plot in Figure 48 shows the relationship, with an R^2 value of 0.04 ($F = 0.57$, $p = 0.46$), indicating no significant linear correlation between raw mobility counts and actual trip counts. Since the p-value for the conducted F-test is not significant ($p > 0.05$), this means there is no evidence to reject the null hypothesis that the β_1 coefficient is different from zero.

Correlation Between Average Raw Mobility Counts and Average Actual Counts for Drive-Thru Daiquiri Shop Sites

The correlation analysis was repeated using site-level averages to reduce day-to-day variability. The resulting comparison is presented in Table 62 and Figure 49. The R^2 value increased from 0.04 ($F = 0.57$, $p = 0.46$) to 0.14 ($F = 0.16$, $p = 0.76$). Since the p-value for the conducted F-test is not significant ($p > 0.05$), this means there is no evidence to reject the null hypothesis that the β_1 coefficient is different from zero. Additionally, the results provide no evidence of a linear correlation between the average raw mobility data and the average actual trip counts, which may be due to the small sample size.

Figure 48. Correlation between raw mobility counts and actual trip counts for drive-thru daiquiri shop sites

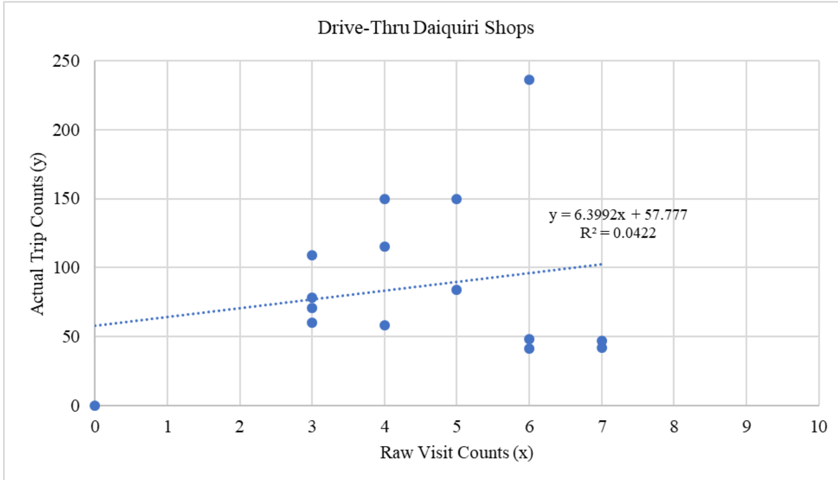
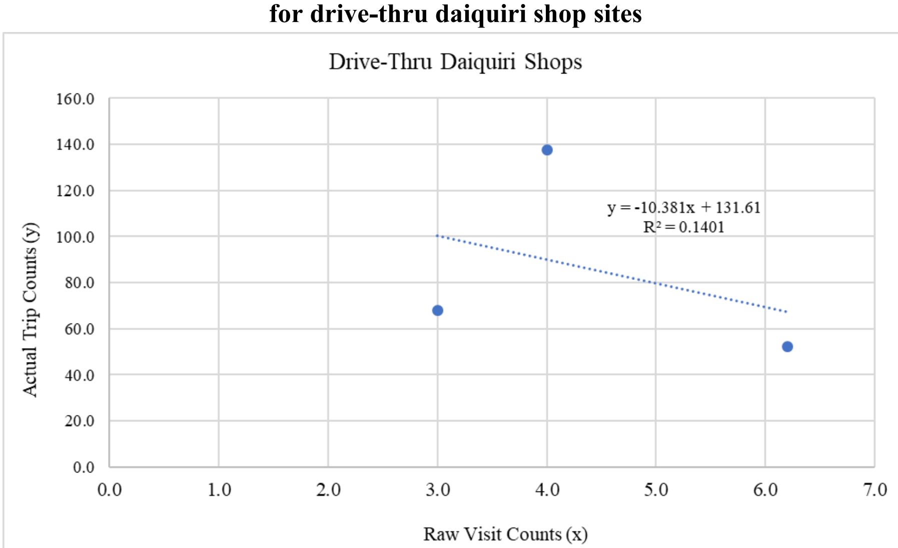


Table 61. Comparison between average raw mobility counts and average actual trip counts for drive-thru daiquiri shop sites

Site	Average raw mobility counts	Average actual trip counts
A	4.0	137.6
B	3.0	67.8
C	6.2	52.4

Figure 49. Correlation between average raw mobility counts and average actual trip counts for drive-thru daiquiri shop sites



Summary of Findings of Mobility Data Analysis for Drive-Thru Daiquiri Shop Sites

The findings of analyzing mobility data for drive-thru daiquiri shop sites demonstrate that:

1. The normalized mobility counts do not consistently overestimate or underestimate the actual counts.
2. The low R^2 value of 0.14 ($F = 2.08$, $p = 0.17$) between normalized visit counts and the actual trip counts suggests that the current scaling method used by a third-party mobility data provider is not suitable for directly estimating trip rates for drive-thru daiquiri shop sites.
3. The non-significant F-test ($p > 0.05$) indicates no evidence that β_1 differs from zero or that a linear relationship exists between the mobility data and the actual trip counts. This may be due to the small sample size.

The results showed no evidence that these third-party mobility data are useful as a single predictor of actual weekday trip counts.

Conclusions and Recommendations

Objective 1: How much variability is there in the trip rates among the sites and throughout the week?

For all six land use types studied in this project, site variability ranged from moderate to extreme. Across days of the week, it ranged from low to high, with urgent care and dollar store sites both showing low day-to-day variability and the other four land use types showing moderate to high variability. Hence, it can be concluded that future research on trip rates for these six land use types should include a sufficiently large, geographically diverse sample of sites and generally involve measurement throughout the week. It is noted that weekend data were not included in this project, although ITE provides weekend trip rates for most land use types. Therefore, it is recommended that future studies include weekend data collection.

Objective 2: Are the trip rates significantly different from ITE trip rates?

Statistical significance cannot be determined from the very small samples used in this study; however, for all evaluated land use types, ITE trip rates do not appear to be reasonable estimates. For apartment complex, car wash, and urgent care sites, the observed rates varied relative to ITE trip rates, ranging from 28 to 131% of the ITE average trip rates. For dollar store sites, the observed rates were always higher than the ITE average trip rate, with the observed to ITE average rate ranging between 114 and 174%. For drive-thru bank sites, the observed to ITE average rate ranged from 44 to 471%, with Site E being the only case above ITE maximum trip rate. For drive-thru daiquiri shop and drive-thru boil shop sites, there are no corresponding ITE trip rates. Further, these two land use types were shown to require separate consideration.

Objective 3: Is variability with contextual factors apparent?

All land use types showed variability across at least two of the three contextual factors selected for this research. The LMMs for each land use type provided strong evidence of the impact of contextual factors on observed trip rates. Additional research may be warranted to refine the selection of contextual factors, but those used in this study generally showed impacts that were consistent with expectations. It may also be worthwhile for future research to consider three or more levels of each contextual factor rather than two, to provide clearer indications of effects on trip rates. However, this will require data to be collected from a significantly larger sample of land use types.

Objective 4: What should be the priority for determining new trip generation rates for use in Louisiana?

In terms of priority for future research, drive-thru daiquiri shops and drive-thru boil shops appear to be the highest priority because of the lack of rates in the ITE Trip Manual, the very high variability from site to site and high variability by day of week, and, as noted below, apparent sensitivity to contextual variables. Additionally, the number of trips generated by these land use types is high, so the impact on adjacent streets is large. The remaining land use types, ranked in priority order, are apartment complexes, car washes, drive-thru banks, dollar stores, and urgent care facilities. The two drive-thru shop types are considered the highest priority because there are no appropriate rates in the ITE Trip Generation manual and the trip volumes are quite high. Urgent care facilities generate very few visits and are therefore considered the lowest priority. Table 63 shows the factors that were used to determine the priorities.

Table 62. Basis of priorities for future research on land use types in Louisiana

Priority	Land use type	Relation to ITE trip rates	Effect of contextual variables	Site-to-site variability	Day-to-day variability	Average impact on local streets
1	Drive-thru daiquiri shops	None	2 of 3 significant	Very High CV=62%	High CV = 34%	30 to 200 trips per day
1	Drive-thru boil shops	None	2 of 3 significant	Very High CV= 63%	High CV = 31%	30 to 200 trips per day
2	Apartment complexes	44-129%	All 3 significant	High CV = 47%	Moderate CV = 12%	300 to 850 trips per day
3	Car washes	28-118%	2 of 3 significant	High CV = 54%	Moderate CV = 17%	180 to 850 trips per day
4	Drive-thru banks*	44-471%	2 of 3 significant	Extreme CV=103%	Moderate CV= 22%	100 to 1300 trips per day
5	Dollar stores	114-174%	2 of 3 significant	Moderate CV = 17%	Low CV = 5%	290 to 450 trips per day
6	Urgent care facilities	65-131%	2 of 3 significant	Moderate CV = 26%	Low CV = 6%	40 to 80 trips per day

* Includes Site E, which may be an outlier. Excluding this site drops the range to 25 to 99% of ITE trip rates, and the CVs to High at 62% and Moderate at 18%, respectively.

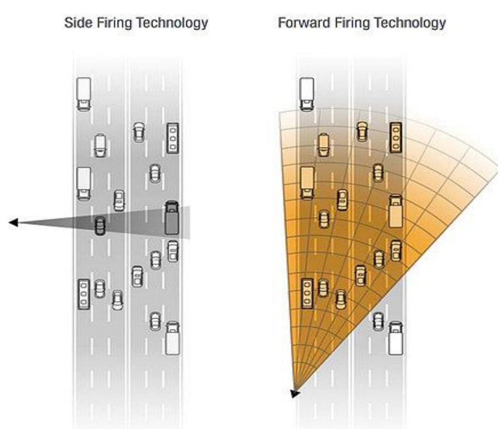
Objective 5: Can new micro-radars provide more accurate counts?

In this research, micro-radars were used. Subsequently, the research team supplemented radar data collection with video recording and automated video processing techniques using the YOLO tool, which achieved higher accuracy in estimating the number of trips, especially in certain locations where the radar detected phantom vehicles. However, video-based counts could not be obtained in low-light conditions.

The advantages of using micro-radar devices include the ability to collect continuous vehicle detection data over five full workdays, good performance in low-light environments, including areas illuminated only by vehicle headlights, and their usefulness in conditions where traditional video or visual-based methods may fail due to poor lighting, including in heavy rain.

However, the limitations and challenges of using micro-radar devices include the requirement for pre-site and on-site configuration, where count zones must be constructed in advance using Traffic UI software. Configuration must be completed on-site after installation, which is a very time-consuming process. The configuration also requires a minimum of two persons on-site and one in the office during setup. For installation, a mounting height of approximately four meters is recommended, so a bucket truck is required to transport the equipment and lift the radar camera to installation height. Equipment includes a mounting pole, radar camera, communication box, and two batteries, all of which are necessary for data collection for five full days. The radar uses forward-facing technology, meaning it must capture the front or rear of the vehicle to detect it correctly, as shown in Figure 50, and it cannot detect vehicles from the side, which significantly limits flexibility in placement.

Figure 50. Side-firing and forward-firing technology
Source: [Website](#) of the radar vendor



The micro-radar devices were found to exhibit inconsistent performance, with accuracy varying between days and even within the same day (e.g., morning, afternoon, and evening) due to environmental factors (e.g., traffic flow, rain, temperature). Additionally, the radar waves may be highly affected by reflections from crossing vehicles; in some cases, this was observed even when the radar was installed at the recommended height. Interference can occur if another radar is installed nearby, possibly leading to missing data for all or part of a day. In some areas, signal issues can affect the connection, hindering the on-time completion of the required on-site configuration. Overall, it is concluded that forward-firing micro-radar devices are not suitable for this application, but side-firing devices may be more useful.

Objective 6: Can third-party mobility datasets provide accurate count data for computing trip rates?

Third-party mobility datasets were found for all of the land use types evaluated, with the exception of apartment complex sites. In no case was there a statistically significant correlation between the raw or normalized counts and the actual data observed through the video cameras and micro-radar devices. In all cases, when looking at daily counts, the R^2 between actual and mobility raw or normalized counts was less than 0.2, except for dollar stores, where it was 0.23. Also, the scatter plots for the daily counts do not reveal an obvious non-linear relationship that could be explored.

Given that this research focused only on daily trip rates, it would be worthwhile to examine hourly trip rates from mobility data. If the distribution of hourly visits from mobility data was similar to the hourly distribution of actual count data, then there may be a way to factor mobility data to produce hourly rates for the four hourly periods of interest: morning peak hour of the adjacent road, morning peak hour of the land use type, evening peak hour of the adjacent road, and evening peak hour of the land use type. Hourly data became available at the end of this project.

Recommendations for Further Research

This project made it clear that for the six land use types investigated, existing ITE trip rates are not well-suited for planning and decision support in Louisiana. The ITE trip rates exhibit both underestimation and overestimation for most land use types, including apartment complex, car wash, drive-thru bank, and urgent care sites. In contrast, for dollar store sites, the ITE average trip rate consistently underestimate the trip rates generated. Additionally, the trip rates are significantly affected by the contextual variables used in this research.

It is recommended that the highest priority for further research be placed on studies of the two drive-through shop types, given the absence of appropriate rates in the ITE Trip Generation Manual and the high trip volumes they generate. This study should collect data from a sufficiently large sample of such sites to allow for statistically robust relationships to be developed between trip rates and the three candidate contextual variables, requiring a minimum of 40 sites (assuming two levels per contextual variable). This would yield five sites for each possible combination of the three contextual variables, which is sufficient to detect a statistically significant relationship. Ideally, sites should be selected throughout Louisiana. At a minimum, sites should be added in DOTD Districts 02, 03 and 08, together with those in Districts 61, 62, and 05. It is also recommended that this research include a test of side-firing radar devices, particularly those that are equipped to provide automatic counts.

Following the two drive-thru shop types effort, further research should be undertaken for apartment complex, car wash, and drive-thru bank sites. However, as explained earlier, these are of lower priority. Because mobility data can significantly reduce the time and effort required to collect data and produce observed counts by land use type and contextual variables, further research into the hourly distribution of visits is worthwhile.

Acronyms, Abbreviations, and Symbols

Term	Description
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
cm	centimeter(s)
CV	Coefficient of Variation
DOTD	Louisiana Department of Transportation and Development
DSI	Data Science Initiative
FHWA	Federal Highway Administration
FY	Fiscal (Financial) Year
ft.	foot (feet)
GFA	Gross Floor Area
HTS	Household Travel Survey
in.	inch(es)
ITE	Institute of Transportation Engineers
LTRC	Louisiana Transportation Research Center
lb.	pound(s)
m	meter(s)
MXD	Mixed Use Development
POI	Point of Interest
RMSE	Root Mean Square Error
SOPHI	System for Observation of Populous and Heterogenous Information
TOD	Transit-Oriented Development
USDOT	US Department of Transportation
YOLO	You Only Look Once algorithm

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Appendix A: Detailed Description of the Pre-Test and Pilot Tests

Pre-Test at The Crescent, Baton Rouge

The purpose of the pre-test at The Crescent apartment complex in Baton Rouge was primarily to determine whether the micro-radar device could provide counts of entering and exiting vehicles, how to mount the device, and to make initial comparisons with the video camera technology. Useful lessons were learned from this test: comparing radar counts with visual counts showed fairly good accuracy from the radar device, while the automated camera counts were much less accurate. At the time of this test, LTRC had acquired one micro-radar device and, based on these test results, decided to acquire a second device.

Pilot Test Results for Two Sites in Hammond

First Trial

The first trial involved cameras mounted at The Grande Apartments and Big Bad Ben Car Wash. These cameras were in position, obtaining counts and video, starting on April 15. The first trial focused on data collected on April 15-16, 2024, at these two locations. At this time, the micro-radar devices were not used.

The camera location was satisfactory for vehicle counting but not for determining the impact of apartment traffic on the roadway serving the apartment complex. The approximate camera angle is shown in Figure 51. Vehicles were seen entering the loop, but whether they returned to the apartments or exited to North Morrison Boulevard could not be determined. Later observation indicated that the bay on the south side of the loop is for trash, and that the loop is where schoolchildren are picked up and dropped off by the school bus. As a result, school buses were not counted, while residents who drove down to deposit trash were counted, even if they then returned to their apartments without ever leaving the complex.

For the main survey, it was imperative that the camera and/or radar device be mounted to intercept traffic entering and exiting the roadway. Several counts were made from the video as a sampling to check between visual counts and those provided by the CountCAM4 cameras. The results are shown in Table 64. Several conclusions can be drawn from this table.

Figure 51. Camera angle at the entrance to The Grande apartment complex

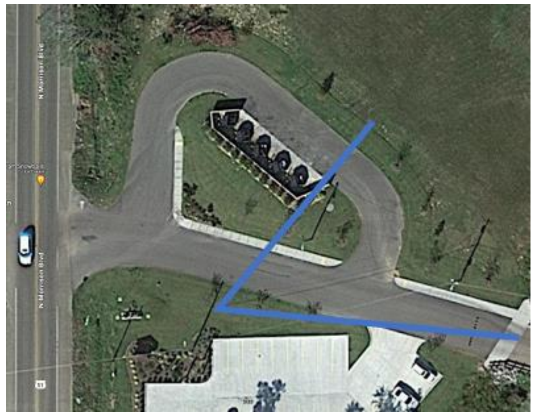


Table 63. Comparison of automated camera counts and visual counts

Date	Time	Volume 1	Volume 2	In		Out	
				Comments	Count	Count	Comments
4/16/24	05:45	2	4	Dark	0	2	Dark
	06:00	3	7		1	5	
	06:15	3	1		1	4	1 bicycle
	06:30	1	11	Getting light	1	12	
	06:45	2	6		2	6	
	07:00	1	11	1 bicycle	0	9	Light
	07:15	3	18		3	17	
	07:30	2	39		2	38	
	07:45	4	35	1 school bus	4	33	
	08:00	4	13		5	13	
	08:15	7	14		5	14	
	Total	32	159		24	153	
	10:30	18	28		14	28	
	10:45	24	33		24	31	
	11:00	18	16	1 pedestrian	19	14	
	11:15	22	7		23	7	
	11:30	17	17		17	17	
	Total	99	101		97	97	
	19:30	29	21	Getting dark	25	17	
	19:45	23	25		15	11	1 pedestrian
	20:00	32	32	Dark	15	13	
	20:15	30	12		17	6	
	Total	114	90		72	47	

Automated camera counts are highly unreliable in the dark; they are generally much higher than visual counts. However, once it is light, the automated camera counts and visual counts are generally very close. It appears that, in aggregate, the automated camera counts are 5 to 10% higher than expected during daylight hours, though there are occasional undercounts. It is also apparent that the automated camera does not count pedestrians and bicycles, and the school bus was apparently not counted. The visual counts are vehicles only and do not include pedestrians, bicyclists, or school buses. Looking at the totals rather than the individual 15-minute counts, it is apparent that the automated camera consistently overcounts, particularly in failing light and darkness.

From the experiment at The Grande apartment complex, where the camera did not have the main thoroughfare in its view, the conclusion is that in daylight, the camera provides counts within 5 to 10% of actual volumes.

For the car wash, the video camera was poorly positioned for this check. It was across a five-lane road with a median from the entrance and exit of the car wash. Large vehicles completely masked the view of the entrance and exit, and this was worst when a semi-trailer traveling from the west made a right turn into the shopping center opposite the car wash. In these instances, the view of the entrance and exit could be obstructed for 15 to 20 seconds. The position also made it difficult to determine if a vehicle had turned into the car wash or had exited. As a result, the visual counts were less reliable than desired.

Before examining the visual counts in comparison to those obtained from the automated camera, two observations can be made about the camera counts. While it is not known which of the two volumes is in or out, one of the two volumes counted 107 vehicles for the 70-hour counting period, while the other counted 853. In fact, the two counts should be approximately equal, since vehicles only visit the car wash for a short time. Second, the car wash operated only between 7:00 a.m. and 7:00 p.m., and cones were placed across the entrance and exit to prevent vehicles from entering or exiting the site outside those hours. However, over the three nights the camera was in position, it recorded total counts of 25, 25, and 31 vehicles in one direction between 8:00 p.m. and 7:00 a.m., and 23, 22, and 21 in the other direction during the same hours. These counts were scattered throughout the night.

These two facts suggest that the camera at this site was unable to provide counts of any value. This is further confirmed by the validation counts, as shown in Table 65. It can be seen immediately that there is so little correspondence in the values that it is impossible to deduce which of volumes 1 and 2 is the in volume and which is the out volume. Second, the visual counts are well-balanced. On the afternoon of April 15, 2024, there were 29 entering vehicles and 34 exiting vehicles. The next morning, there were 13 entering vehicles and 8 exiting vehicles, while in the early afternoon, there were 21 entering vehicles and 32 exiting vehicles. These numbers are well-balanced. However, the CountCAM4 counts are substantially unbalanced, to the point that adding them up is unnecessary. In fact, in the two periods sampled on April 16, there were no vehicles recorded in one direction, but many vehicles recorded in the other direction.

Table 64. Comparison of visual and automated camera counts at Big Bad Ben Car Wash

Date	Time	Volume 1	Volume 2	Visual counts	
				In	Out
4/15/24	16:30	1	6	6	5
	16:45	0	11	2	8
	17:00	0	6	7	3
	17:15	0	6	3	6
	17:30	0	4	4	3
	17:45	0	8	7	9
4/16/24	7:00	0	0	2	2
	7:15	0	0	3	1
	7:30	0	2	4	3
	7:45	0	5	2	1
	8:00	0	6	2	1
	13:00	0	6	5	6
	13:15	0	1	4	7
	13:30	0	10	3	6
	13:45	0	4	4	6
	14:00	0	11	5	7

At the car wash site, the automated camera's location was severely compromised, so counts of any use could not be obtained there. Further investigation is required for this site to determine what went wrong with the siting of the counting camera, while also noting that the video camera was in a compromised position.

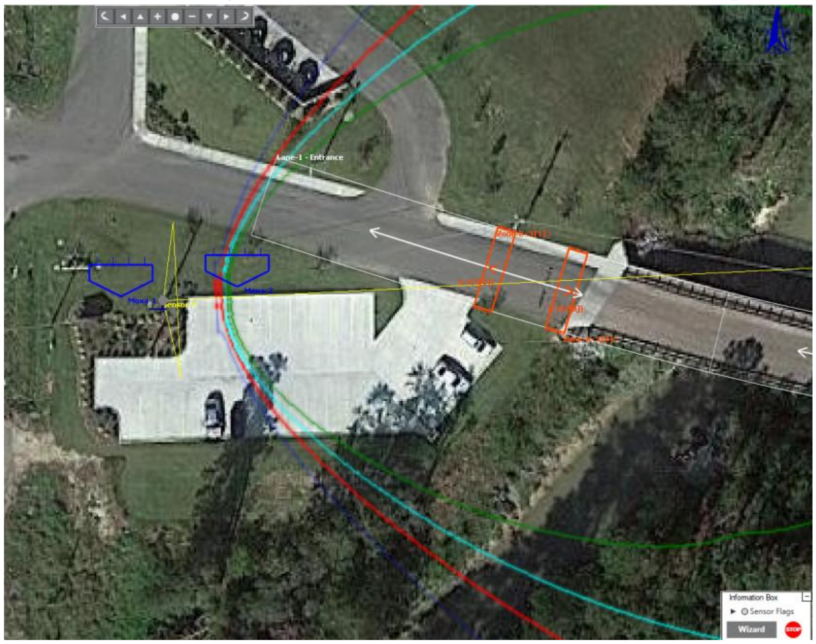
From these two tests, several conclusions can be drawn. First, it is apparent that the automated cameras cannot produce useful counts before sunrise and after sunset, which will limit their usefulness for this project. Second, when sited so that the camera view does not include a major thoroughfare, daylight counts from the camera are within 5-10% of the visual counts, although the automated cameras consistently overcount. Third, the positioning of the counting camera for a driveway count, such as at the car wash sites, requires further investigation to determine the best location. The camera in that location was situated in such a way that no useful counts could be obtained. Fourth, a validation video camera must be located differently from how it was at these two sites. This is especially true at the car wash site, where the camera should have been on the same side of the road as the car wash, with a view across the two driveways, rather than being co-located with the counting camera.

Second Trial

In the second trial, adjustments were made to the micro-radar devices to provide as accurate information as possible from the locations where they were installed. Video footage, automated camera counts, and micro-radar counts were compared at both The Grande apartment complex and Big Bad Ben Car Wash. In these tests, not only can the accuracy of the micro-radar devices be obtained, but their accuracy can also be compared to the automated camera count accuracy.

For the apartment complex site, the same criticism applies to the location of the radar device counting zones as to the automated cameras. If this had been the collection of data in the main survey, the counts obtained would not reflect the actual traffic impacts on the main thoroughfare, North Morrison Boulevard. The location of the counting zones for The Grande is shown in Figure 52.

Figure 52. Location of counting zones for the micro-radar at The Grande apartment complex



The post-trip fine-tuning of the radar devices was completed by 11:30 a.m. on Tuesday, April 23. Five time periods were selected after this time for testing. The results are shown in Table 66.

Table 65. Comparison of automated camera, micro-radar, and visual counts for The Grande apartment complex

Date	Start time	EB automated camera	Radar in	Visual in	WB automated camera	Radar out	Visual out
4/23/24	13:00	21	23	10	11	20	10
	13:15	30	31	24	29	30	25
	13:30	17	17	20	21	15	20
	13:45	20	16	21	23	17	21
	14:00	23	22	17	18	21	17
	14:15	16	14	16	17	14	15
	14:30	18	17	17	21	17	19
	Total	145	140	125	140	134	127
4/23/24	17:00	27	24	21	24	23	21
	17:15	26	28	23	22	26	23
	17:30	26	26	27	27	26	27
	17:45	15	15	19	19	16	17
	18:00	16	13	19	19	14	19
	18:15	21	19	16	22	17	18
	18:30	22	16	13	11	17	12
	Total	153	141	138	144	139	137
4/24/24	6:45	2	1	9	7	0	11
	7:00	1	1	8	11	4	14
	7:15	1	0	19	21	2	15
	7:30	7	5	22	32	2	26
	7:45	8	6	26	26	4	17
	8:00	2	2	10	12	8	12
	8:15	5	3	6	14	3	14
	Total	26	18	100	123	23	109
4/24/24	11:00	13	19	14	15	14	26
	11:15	19	13	13	11	18	13
	11:30	16	15	12	13	16	16
	11:45	11	14	16	18	12	17
	12:00	18	21	11	18	18	16
	12:15	26	18	25	21	22	21
	12:30	21	19	13	13	17	11
	Total	124	119	104	109	117	120
4/25/24	7:00	7	4	15	18	4	15
	7:15	3	2	12	16	2	15
	7:30	4	2	20	34	2	27
	7:45	4	3	23	20	4	17
	8:00	8	7	14	14	8	12
	8:15	4	6	12	14	3	14
	8:30	2	1	8	6	2	6
	Total	32	25	104	122	25	106

As it did in the first trial, the automated camera consistently overcounted, based on the totals for each period observed. In contrast, the micro-radar devices always counted less than the automated cameras. However, both micro-radar devices and automated cameras over- and under-count the actual observed counts. Across all five time periods, the automated camera recorded 480 vehicles entering, while the micro-radar devices recorded 443, and the visual counts recorded 438. For exiting vehicles, the automated camera count was 638, the radar count was 571, and the visual count was 599. For entering vehicles, the automated camera recorded an overcount of 9.6%, while the micro-radar recorded an overcount of 1.1%. For exiting vehicles, the automated camera overcount was 6.5%, while the micro-radar undercount was 4.7%. In both cases, the micro-radar devices were more accurate. These results are biased in favor of the radar devices because of the inclusion of early morning hours when it is known that the automated cameras are less accurate. If we exclude the two early morning periods, the automated camera provided an entering total of 422 and an exiting total of 393. These compare to the visual counts of 390 and 384, respectively. The micro-radar counts were 400 and 367, respectively. The conclusion from these numbers is that, excluding the early mornings when it was getting light, the automated camera still overestimates both figures, while the micro-radar overestimates entering vehicles and underestimates exiting vehicles.

For Big Bad Ben Car Wash, the radar device was mounted on the opposite side of US 190 from the car wash, with five lanes of traffic and a median, as shown in Figure 53. Vehicles enter the carwash from the lane on the right side of the picture, where the inward arrows appear. They exit to the left, almost directly opposite the radar device. From the video, it was noted that a few vehicles entered on the exit side. More than half of the vehicles exiting the car wash made a U-turn to use the vacuum stations to the right of the building. The video camera was co-located with the radar device but set some distance below it. The counting zones for the micro-radar are also shown in Figure 53.

The video camera location was not ideal, because large vehicles passing along US 190, particularly those turning into the driveway on the right of the radar location from US 190, blocked the video camera view of the entrance and exit to the car wash. It is unclear what effect these vehicles might have on the radar counts. The results of the counts for four time periods are shown in Table 67.

The results from the automated camera are included as further confirmation of the earlier finding that the camera's location is poor and continues to produce poor results. Again, it is unclear which direction each column represents, but the results confirm that the location was poor.

Figure 53. Location of counting zones for the micro-radar at Big Bad Ben Car Wash

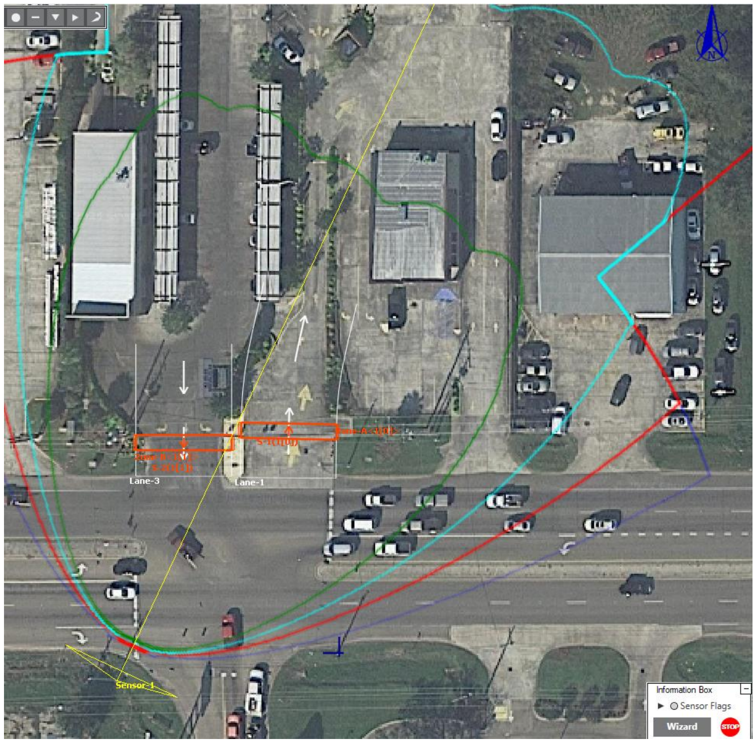


Table 66. Comparison of the automated camera, micro-radar, and visual counts at Big Bad Ben Car Wash

Date	Start time	EB automated camera	Radar in	Visual in	WB automated camera	Radar out	Visual out
4/23/24	14:00	2	2	3	8	6	7
	14:15	2	6	5	9	6	7
	14:30	2	5	6	10	8	6
	14:45	4	6	9	5	6	5
	15:00	4	5	4	8	6	5
	15:15	2	5	5	4	4	3
	15:30	1	6	5	13	8	7
	Total	17	35	34	57	44	33
	17:15	0	6	4	3	7	4
	17:30	2	3	3	8	5	5
	17:45	1	5	5	4	1	3
	18:00	2	5	5	5	7	3
	18:15	0	3	3	4	5	5
	18:30	1	3	2	7	10	3
	18:45	0	1	0	2	3	1
	Total	6	26	22	33	38	24
4/24/24	7:00	1	4	2	2	3	0
	7:15	0	0	0	2	2	1
	7:30	2	3	3	2	1	1
	7:45	4	6	4	5	5	2
	8:00	2	3	3	10	4	3
	8:15	1	7	5	7	3	4
	8:30	4	4	6	6	8	5
	Total	14	27	23	34	26	16
	10:00	3	11	6	18	16	13
	10:15	3	9	7	7	10	4
	10:30	2	8	10	14	8	10

Date	Start time	EB automated camera	Radar in	Visual in	WB automated camera	Radar out	Visual out
	10:45	2	7	12	14	13	10
	11:00	1	8	4	6	6	4
	11:15	0	3	4	8	3	3
	11:30	2	6	7	11	5	10
	Total	13	52	50	78	61	54

For the micro-radar, the results were better than those for the automated camera but were significantly poorer than those for the apartment complex. It is possible that the device's location was a problem, as it was with the video camera. The counts of vehicles entering the car wash were generally close, with totals for the four periods: 35 versus 34 for the visual count, 26 versus 22, 27 versus 23, and 52 versus 50. These results show that the micro-radar was overcounting in all cases. The total inward volume over the four periods was 140 for the radar and 129 for the visual counts. This represents an error of 8.5%. For the outward movements, the results were 44 versus 33, 38 versus 24, 26 versus 16, and 61 versus 54. The total outward movements counted by the micro-radar were 169, versus 127 for the visual counts, resulting in an overestimate of 33.1%. Because of this large error, several visual counts were recounted, and the results were found to be identical. Unlike at the apartment complex, vehicles often had to wait to exit into the main roadway, with waits sometimes exceeding two minutes. They were generally waiting within the limits of Zone B. It is unclear whether this could have caused the overcounting.

At The Grande apartment complex, the automated camera did not identify any pedestrians or bicyclists as far as can be determined from the results. The radar detected four pedestrians over the test periods, all of which were observed in the visual counts. It missed one pedestrian. For bicycles, it correctly identified three, but measured five that were not seen in the videos. It misidentified a group of five or six joggers twice as two bicycles.

At Big Bad Ben Car Wash, there were many incorrect identifications. Over the two-and-a-half-day period after the device was correctly fine-tuned, it identified a total of 78 pedestrians entering the car wash and 85 exiting. There were also counts of 241 bicyclists entering the carwash and 107 exiting. These are all spurious. There were also 65 entering long trucks and 19 exiting. During the two overnight periods (April 23-24 and April 24-25) when the car wash was closed, with cones used to close off the entrance and exit, a total of 17 pedestrians, 27 bicyclists, nine cars, one short truck, and five long trucks were reported entering the car wash. Similarly, 17 pedestrians, eight bicyclists, seven cars, two transporters, 13 short trucks, and two long trucks were recorded exiting the car wash. Over the same two nights, the automated camera recorded 51 vehicles in one direction and 31 in the other direction.

The results for Big Bad Ben Car Wash suggest that this location needs to be recounted with the cameras and radar device in different positions. Also, the car wash zones should be larger to ensure more accurate measurements of entering and exiting vehicles.

Third Trial

For the third trial, two different locations were used for the micro-radar, and the automated video cameras were placed on either side of the driveways. The first of the two micro-radar locations was the same pole as the one used in the second trial, but this time the device was approximately one meter higher. The counting zones are shown in Figure 54. The results of this trial are summarized in Table 68. Although the devices were out for several days, most checks were conducted on June 27, 2024.

From the totals shown in Table 68, the radar using Zone B overestimated the number of vehicles in all three time periods, although from 11:00 to 13:30, the exiting vehicles are exactly the same between the radar and the visual counts. The largest discrepancies were rechecked, and the visual counts were found to be correct. In total, the radar counted 215 vehicles entering the car wash between 07:00 and 19:00 and 250 vehicles exiting between the same hours. The counts of entering vehicles were 43 by radar and 41 by video, 52 versus 49, and 76 versus 64 for the three time periods in Table 68. Using Zone B instead of Zone C, the exiting counts were 41 versus 35, 51 versus 51, and 79 versus 69, respectively, for the radar versus the video counts.

On the other hand, Zone C showed a significantly higher number of exits and disagreed with the visual counts to a greater extent. A review of the video footage indicates that the higher count in Zone C may be due to vehicles making a U-turn on US 190 and swinging so wide that the vehicle path crosses into Zone C. For this reason, further analysis of the discrepancies in Zone C is not relevant.

An additional check was performed for June 28, 2024, which is shown in Table 69. This was done because of the larger discrepancy found for the 14:00 to 17:30 period on June 27, 2024. The largest discrepancies in Table 68 were counted a second time to ensure there was no error in the visual counts. As shown in Table 69, the inbound vehicle counts were very close during the afternoon period, in contrast to those on June 27, 2024, while the outbound counts showed a larger discrepancy than the inbound counts, similar to the result on June 27, 2024. In this case, entering vehicles were 109 versus 108, and exiting were 132 versus 114.

Figure 54. Location of counting zones for the first location of the third trial at the car wash site

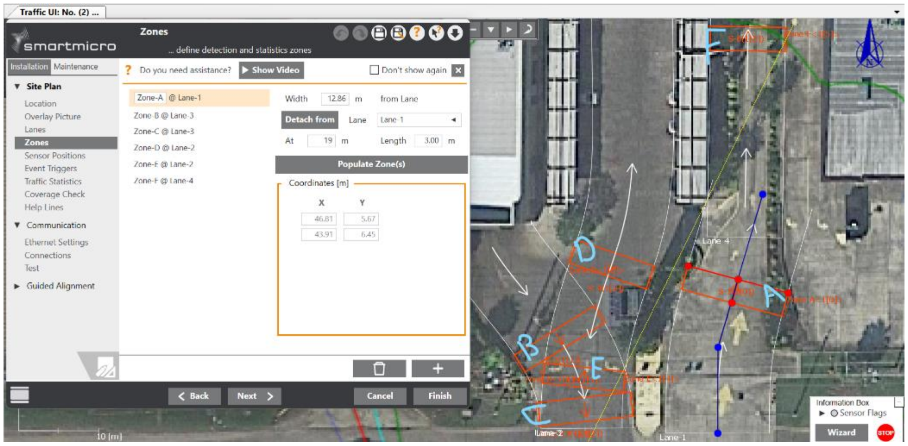


Table 67. Comparison of radar and visual counts for Big Bad Ben Car Wash, June 27, 2024

Date	Start time	Radar in	Visual in	Radar out (B)	Radar out (C)	Visual out
6/27/24	7:00	3	4	2	3	2
	7:15	2	3	6	8	4
	7:30	6	5	6	6	5
	7:45	3	3	3	3	2
	8:00	1	1	1	1	2
	8:15	4	4	3	4	2
	8:30	1	2	2	3	3
	8:45	3	4	0	0	1
	9:00	11	6	6	8	3
	9:15	5	6	8	10	6
	9:30	4	3	4	4	5
		43	41	41	50	35
	11:00	6	6	6	6	5
	11:15	6	5	7	9	5
	11:30	1	0	7	8	5
	11:45	7	7	3	3	2
	12:00	5	4	7	8	5
	12:15	5	6	5	5	6
	12:30	4	5	5	6	4
	12:45	8	6	14	15	10
	13:00	1	1	2	2	2
	13:15	7	7	8	11	5
	13:30	2	2	5	6	2
		52	49	51	79	51
	14:00	7	5	6	7	6
	14:15	3	2	3	4	4
	14:30	4	3	3	3	4
	14:45	6	6	4	5	4
	15:00	1	1	3	4	3
	15:15	2	2	3	4	2
	15:30	8	7	8	8	6
	15:45	5	6	4	5	2
	16:00	10	6	8	8	8
	16:15	9	8	7	8	7
	16:30	3	3	5	5	4
	16:45	5	4	8	9	7

Date	Start time	Radar in	Visual in	Radar out (B)	Radar out (C)	Visual out
	17:00	1	4	4	5	2
	17:15	8	5	4	4	4
	17:30	4	3	9	11	6
		76	64	79	90	69

Table 68. Comparison of visual counts and radar measures for Big Bad Ben Car Wash, June 28, 2024

Date	Start time	Radar in	Visual in	Radar out	Visual out
6/28/24	13:00	5	7	10	8
	13:15	6	7	11	10
	13:30	2	3	9	6
	13:45	9	10	5	5
	14:00	3	1	7	5
	14:15	5	7	6	6
	14:30	5	2	9	9
	14:45	9	8	3	3
	15:00	6	6	6	5
	15:15	2	2	5	4
	15:30	10	2	1	2
	15:45	4	8	4	5
	16:00	6	5	7	5
	16:15	12	4	8	7
	16:30	4	10	8	8
	16:45	6	7	11	7
	17:00	5	4	8	7
	17:15	10	7	7	6
	17:30	4	8	7	6
		109	108	132	114

Overall, the results from this trial indicate that the radar devices yield slightly higher counts than the visual counts, except for one period on the afternoon of June 27. Overall, the radar counts appear to range from exactly the same to as high as 18.7% in error, but were generally approximately 5% in error.

The second location involved mounting the radar at an oblique angle to the car wash driveways. The counting zone locations are shown in Figure 55. This test was done to determine whether an oblique position of the radar device would work, because there were sites for the main survey where no pole was available opposite the areas where counts are needed.

The results of this test are provided in Table 70. Again, radar counts are provided for both counting Zones B and C. Overall, the results of this test show that the radar detected vehicles entering through counting Zone A, although the counts tended to be overestimated compared with the head-on position. However, the exiting counts were severely underestimated. This shows that the oblique position did not work very well as configured. It is possible to improve these results by changing the geometry of the counting zones so that their length is much greater perpendicular to the radar view, providing the radar with more time to detect the vehicles.

Figure 55. Counting locations for the oblique positioning of the radar device at the car wash site, July 11-14, 2024

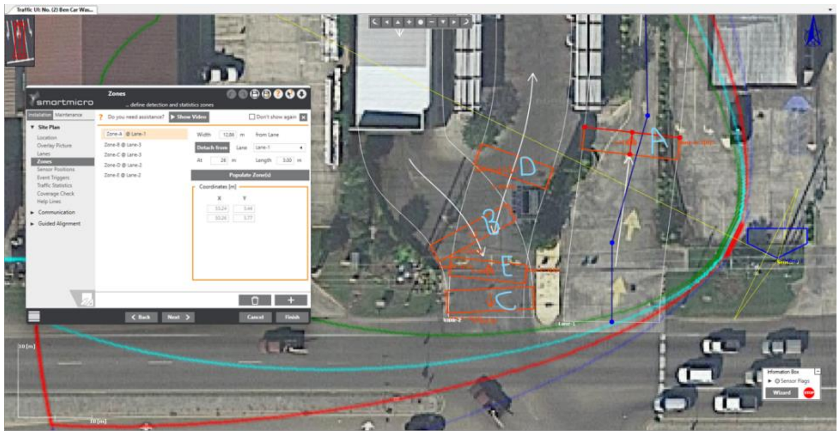


Table 69. Comparison of radar and visual counts for the second test at the car wash site, July 11-14, 2024

Date	Start time	Radar in	Visual in	Radar out (B)	Radar out (C)	Visual out
7/11/24	11:00	4	6	3	6	8
	11:15	8	5	1	1	6
	11:30	12	3	3	4	7
	11:45	4	6	1	0	5
	12:00	8	6	1	1	2
	12:15	5	5	1	2	4
	12:30	5	5	4	3	7
	12:45	5	4	2	3	6
	13:00	2	4	2	1	3
	13:15	9	8	1	1	6
		62	52	19	22	54
	16:00	1	2	1	0	2
	16:15	2	1	1	1	0
	16:30	0	0	1	1	1
	16:45	1	1	1	2	2
	17:00	1	3	3	1	1
	17:15	5	4	2	1	5
	17:30	5	2	2	1	2
	17:45	3	4	1	3	4
	18:00	1	0	1	0	0
	18:15	3	2	1	1	2
	18:30	1	1	2	1	1
	18:45	3	3	2	4	4
		26	23	18	16	24
7/12/24	7:00	2	1	0	0	0
	7:15	3	2	0	0	0
	7:30	3	4	1	2	2
	7:45	2	2	3	5	2
	8:00	3	3	1	1	3
	8:15	4	3	2	2	3
	8:30	3	1	1	1	2
	8:45	5	7	1	1	2
	9:00	8	7	3	3	6
	9:15	7	4	0	1	6
	9:30	6	7	0	1	3
	9:45	8	5	0	1	4
		54	46	12	18	33

The third trial for The Grande apartment complex involved siting the radar device across North Morrison Boulevard, opposite the apartment complex's entrance and exit. This is shown in Figure 56. The video camera was located on the utility pole on the same side of North Morrison Boulevard, looking across the driveway to the apartment complex. The trial took place from July 3 through July 8, 2024. The video camera location proved extremely effective for counting vehicles entering and exiting the apartment complex. Several visual counts were performed from the video and compared with the radar results.

The results for July 4 and 5 are shown in Table 71. The biggest differences occurred between 14:00 and 16:30 on July 5, apart from the 15-minute period from 13:30 to 13:45 on July 4. That 15-minute period was not included in the totals for the late morning early afternoon counts on July 4. It was a period of very heavy rain, and this appears to have affected the inbound count for that period. The radar also indicated 157 bicycles and six pedestrians in that 15-minute period. Interestingly, the outbound count did not seem to be affected. The rain was driven by the winds from west to east, which was the direction of inbound movement. Other than that, the 15-minute periods showing the largest discrepancies were recounted and were found to be correct in each case. The inbound count on the afternoon of July 5 showed the largest error, and it is unclear what caused it. It is almost entirely in the periods 14:00 to 14:15 and 16:15 to 16:45.

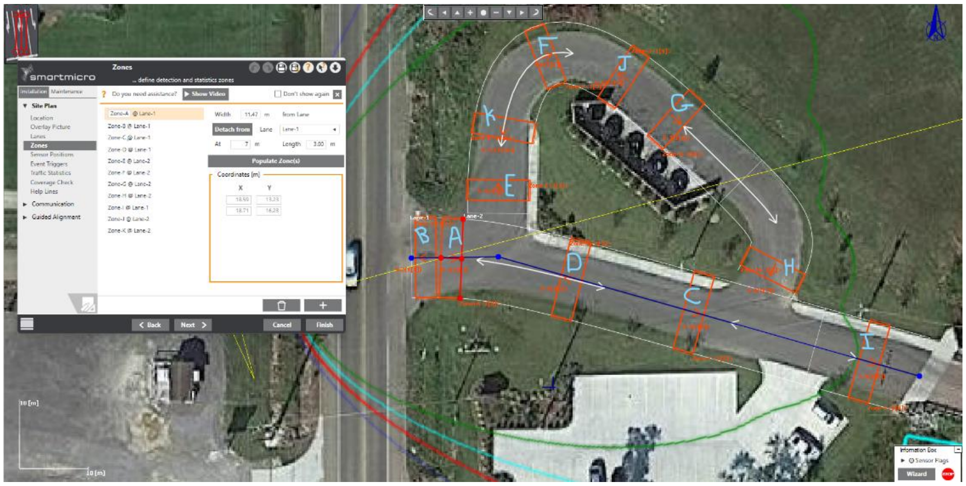
Table 70. Comparison of radar and visual counts for The Grande apartment complex, July 4-5, 2024

Date	Start time	Radar in	Visual in	Radar out	Visual out
7/4/24	6:00	1	0	3	2
	6:15	2	2	2	3
	6:30	3	2	5	3
	6:45	3	2	7	6
	7:00	0	0	2	2
	7:15	1	1	0	1
	7:30	1	1	3	5
	7:45	5	6	17	16
	8:00	3	4	6	4
	8:15	1	2	2	5
	8:30	3	3	7	3
		23	23	54	50
	11:00	7	7	12	8
	11:15	2	3	3	3
	11:30	5	6	6	5
	11:45	4	4	7	9
	12:00	4	6	7	5
	12:15	9	13	6	6
	12:30	8	7	10	7
	12:45	9	9	5	7
	13:00	12	6	14	12

Date	Start time	Radar in	Visual in	Radar out	Visual out
	13:15	6	4	12	14
	13:30	67	6	9	13}
		66	65	91	89
7/5/24	14:00	16	10	8	8
	14:15	4	4	8	5
	14:30	3	3	2	2
	14:45	6	7	3	2
	15:00	9	6	6	6
	15:15	6	7	13	10
	15:30	9	6	9	9
	15:45	9	5	10	10
	16:00	6	9	8	5
	16:15	12	5	4	4
	16:30	12	9	5	6
		102	71	76	67
	18:00	5	6	5	3
	18:15	4	4	3	5
	18:30	4	4	6	3
	18:45	7	7	4	4
	19:00	3	4	1	0
	19:15	8	2	7	9
	19:30	6	11	8	6
	19:45	13	9	11	9
	20:00	17	14	11	11
		67	61	56	50

Comparing the counting periods, the numbers of entering vehicles were 23 by radar and 23 by visual count, 66 versus 65, 102 versus 71, and 67 versus 61. Exiting volumes were 54 by radar and 50 by visual count, 91 versus 89, 76 versus 67, and 56 versus 50. These show a generally high correspondence between the radar results and actual counts.

Figure 56. Measurement zones for The Grande apartment complex third trial



Appendix B: Site Detail Reports for 26 Weeks

Week 1: LA Boilers and Lake Urgent Care, Hammond

LA Boilers, Baton Rouge

This is a fairly straightforward site, with entry to the south and exit to the north. There is a utility pole opposite the site, which is located approximately 100 feet from the entrance and exit to the site. This is circled in blue in Figure 57.

Figure 57. LA Boilers, Baton Rouge site map

The measurement zones are shown as red rectangles, labeled Zone A and Zone B. These should be adequate to measure vehicles using the drive-thru and those parking in front of the site.

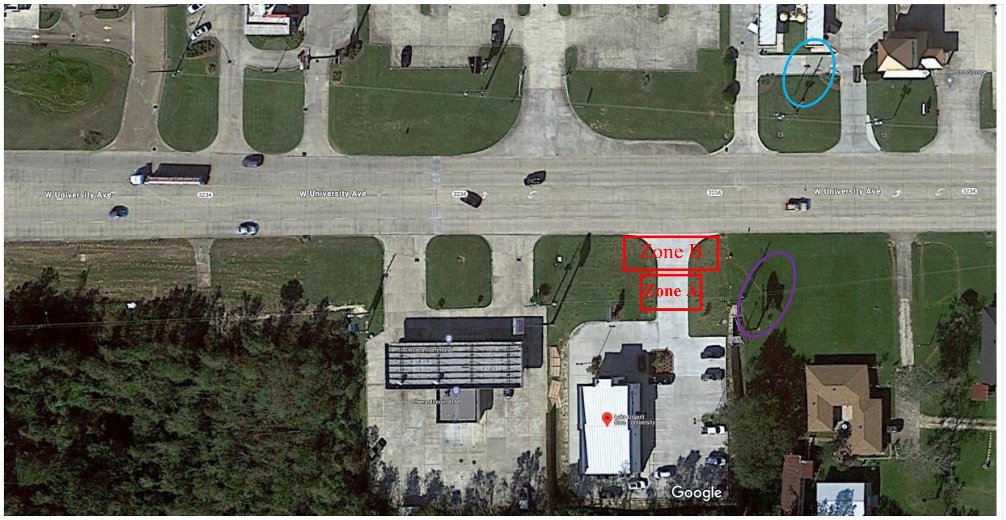
The utility pole circled in purple should be a good location for the video camera. The distance across the two driveways is approximately 80 feet. A video camera could also be co-located with the SMATS radar device, but large trucks will likely interfere with the view of the entrance and exit.

Lake Urgent Care, Hammond

This site is slightly more challenging because the available utility poles are over 150 feet from the entrance. The closest one is to the east of the entrance on the north side of University Avenue. This is circled in blue in Figure 58. It is 153 feet from the far side of the entrance to the urgent care facility. The two counting zones are shown in red, with Zone A for entering traffic and Zone

B for exiting traffic. The radar device will need to be mounted as high as possible to avoid interference from large trucks on West University Avenue.

Figure 58. Lake Urgent Care, Hammond site map



The utility pole circled in purple would be the best location for the video camera. It is only 53 feet from the far side of the driveway into the facility.

Accessing the Sites

These two locations are not close to one another. According to Google Maps, it is approximately 35 minutes from LA Boilers in Baton Rouge to Lake Urgent Care in Hammond. It will take 20 minutes to get from LTRC to LA Boilers, 35 minutes to get to Lake Urgent Care from LA Boilers, and 45 minutes to return to LTRC. These two sites are in different DOTD districts; LA Boilers is in District 61, and Lake Urgent Care is in District 62.

Week 2: Patient Plus Urgent Care

Delmont Patient Plus Urgent Care, Baton Rouge

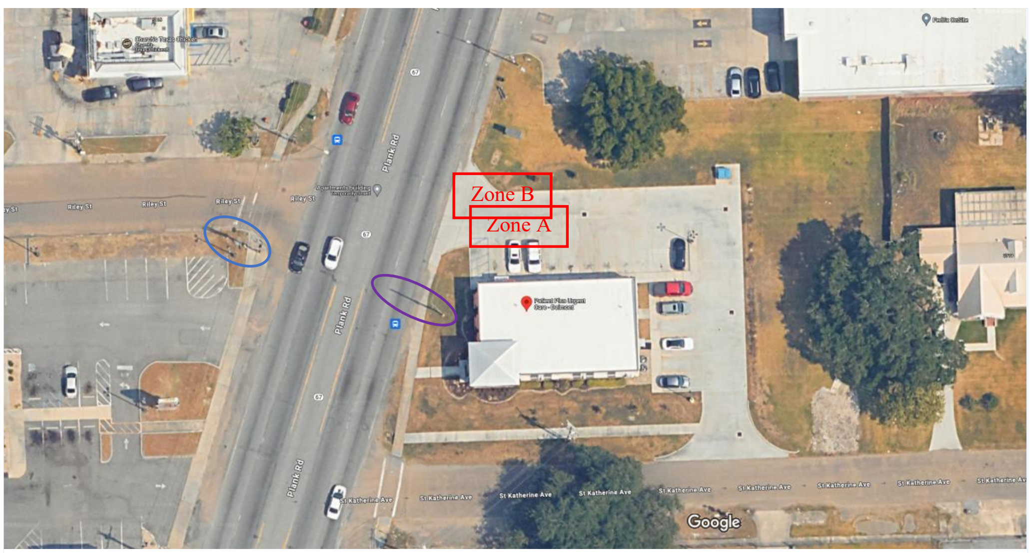
This could be a problematic location because it has two entrances, one off Plank Road and one off St. Katherine Avenue. It is assumed that this site may need two radar devices, because the driveways are at right angles, and if the radar needs to be in a forward-firing position, this cannot be achieved for both entrances and exits with a single radar device.

Location on Plank Road

To monitor the driveway off Plank Road, the best location appears to be the utility pole at the south corner of Riley Street and Plank Road, as shown in Figure 59. This pole is 105 feet from the middle of the Plank Road entrance and exit. This utility pole is circled in blue. Zone A is for entering vehicles, and Zone B is for exiting vehicles. Zone A must start on the west at the first parking space to ensure all vehicles entering and parking at this entrance and exit are counted. Zone B should be set as far to the west as possible without intruding on Plank Road.

For this driveway, the video camera should be mounted on the utility pole circled in purple to the south of the entrance off Plank Road.

Figure 59. First device location for Delmont Patient Plus Urgent Care, Baton Rouge



Location on St. Katherine Avenue

The second location would be the utility pole at the corner of St. Katherine Avenue. This is approximately 173 feet from the St. Katherine Avenue entrance and exit. The measurement zones for the St. Katherine Avenue entrance and exit would need to be configured as shown in Figure 60. The video camera would be located as shown in Figure 60. This is a somewhat oblique location, necessitated by the lack of utility poles along the south side of St. Katherine Avenue. The only other possibility would be to set the radar device on the same pole as the video camera, but this is even more oblique.

Accessing the Site

According to Google Maps, it will take approximately 20 minutes to travel from LTRC to Delmont Patient Plus Urgent Care.

Figure 60. Second device location for Delmont Patient Plus Urgent Care, Baton Rouge

Week 3: Ouachita Valley Federal Credit Union

Ouachita Valley Federal Credit Union, Monroe

This site requires two radar devices to monitor because of the distance between the two entrances and exits. One is required for US 80/US BUS 165/Louisville Avenue, and another is required for Newcombe Street.

Location on US 80/US BUS 165/Louisville Avenue

For the first location on Louisville Avenue, the best location for the radar device is on the traffic light pole across the road from the main entrance, shown in Figure 61. This pole is approximately 80 feet from the center of the driveway. The video camera should be mounted on the traffic light pole to the south of the driveway, circled in purple in Figure 61. One video camera should be sufficient.

Figure 61. US 80/US BUS 165/Louisville Avenue entrance to Ouachita Valley Federal Credit Union, Monroe

The counting zones should be set up as shown in Figure 61, with Zone A for entering vehicles and Zone B for exiting vehicles.

Location on Newcombe Street

For the Newcombe Street location, there is a utility pole that is ideally located right across from the entrance to the credit union, as shown in Figure 62. The SMATS radar should be mounted on the utility pole on the opposite side of Newcombe Street, as shown circled in blue. This is 34 feet from the entrance. This utility pole appears to be covered with a creeper, and some work may be required to cut away some of the vine to allow attachment of the radar device. The counting zones should be set up as shown, with Zone A being the entering traffic and Zone B being the exiting traffic. The video camera should be located on the utility pole circled in purple. It is located just 32 feet from the center of the entrance.

Accessing the Site

According to Google Maps, it will take approximately 3 hours and 30 minutes to reach the credit union from LTRC via Blues Highway and US 425 N. To have these two radar devices set up in time to begin recording around noon, those leaving LTRC will need to depart at approximately 7:00 a.m. For deinstallation, it will be necessary to leave LTRC by approximately 8:30 a.m. to start deinstallation at approximately noon.

Figure 62. Newcombe Street entrance to Ouachita Valley Federal Credit Union, Monroe

Week 4: Ashford Place Apartment Complex

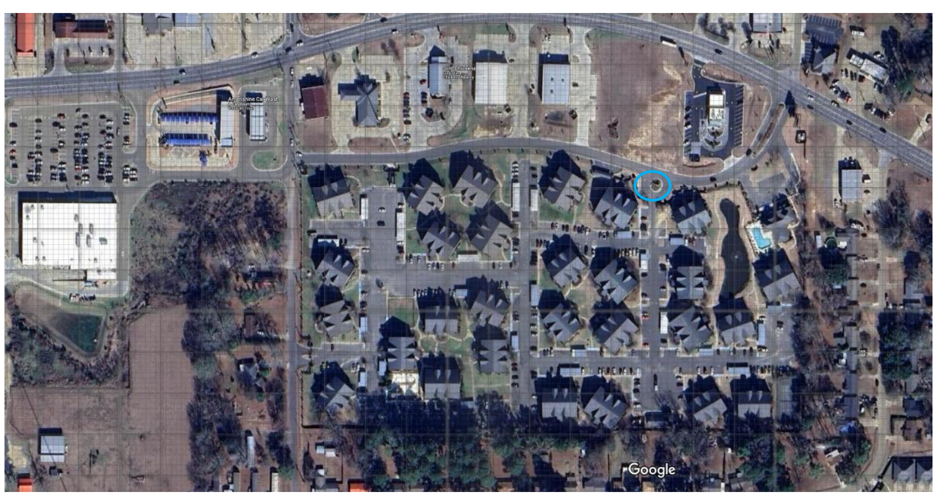
Ashford Place Apartment Complex, West Monroe

This site requires two radar devices to monitor because of the distance between the two entrances and exits. One is required for Ashford Drive, and another is required for Netherlands Street.

Location on Ashford Drive

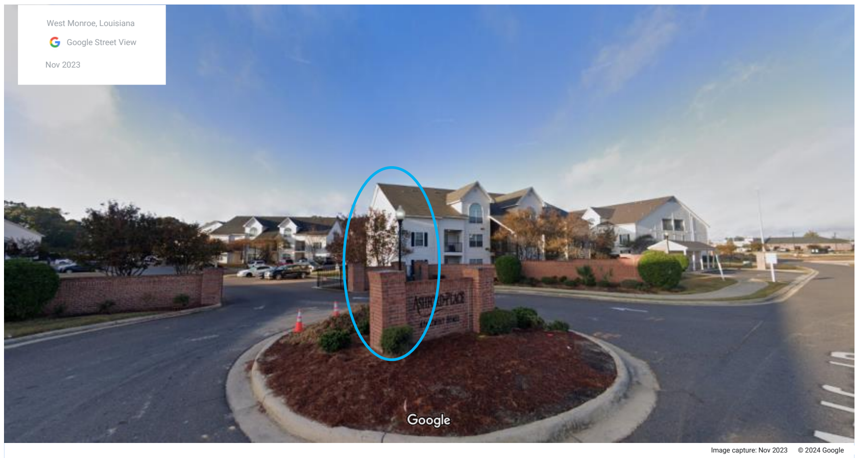
For the first location on Ashford Drive, the best location for the radar device is on the street light pole in the traffic circle at the main entrance to the complex, shown in Figure 63.

Figure 63. Ashford Place apartment complex, West Monroe



The actual location is shown in Figure 64, with the lamp post circled in blue. The video camera will need to be co-located with the SMATS radar, because there are no other usable poles in this vicinity.

Figure 64. Main entrance to Ashford Place apartment complex, West Monroe



The counting zones should be set up as shown in Figure 65.

Figure 65. Ashford Drive entrance to Ashford Place apartment complex, West Monroe

Location on Netherlands Street

At the Netherlands Street location, a utility pole is ideally located directly across from the entrance to the Ashford Place apartment complex, as shown in Figure 66. The SMATS radar should be mounted on the utility pole on the opposite side of Netherlands Street, as shown circled in blue. This is 64 feet from the entrance. The counting zones should be set up as shown, with Zone A for entering traffic and Zone B for exiting traffic. The video camera should be located on the utility pole circled in purple. It is located just 32 feet from the center of the entrance.

Figure 66. Netherlands Street entrance to Ashford Place apartment complex, West Monroe

Accessing the Site

According to Google Maps, it will take approximately 3 hours and 34 minutes to reach the apartment complex from LTRC via Blues Highway and US 425 N. To have these two radar devices set up in time to begin recording at approximately noon, those leaving from LTRC will need to depart at approximately 7:00 a.m. For deinstallation, it will be necessary to leave LTRC by approximately 8:30 a.m. to start deinstallation at approximately noon.

Week 5: Rocketfast Carwash, Ruston, and South Star Urgent Care

Rocketfast Carwash, Ruston

Rocketfast Carwash, located at 1822 Northpointe Lane in Ruston, has one entrance and exit off Northpointe Lane near LA 33/Farmerville Highway. The SMATS radar and the CountCAM4 can be co-located on a utility pole near the Northpointe Business Complex sign. This is shown in Figure 67. The utility pole is circled in blue. The CountCAM4 should be aimed across the entrance and exit to Northpointe Lane and to the northeast of the radar counting zones.

Figure 67. Rocketfast Carwash, Ruston

The counting zones are shown in red. Zone A is for incoming vehicles and needs to intercept vehicles going into the pre-wash bays and those bypassing them and entering directly into the payment booths. Zone B is for exiting vehicles and needs to be positioned so that it does not count entering vehicles. It should be noted that both entering and exiting vehicles will be traveling away from the radar. No vehicles will be traveling towards the radar. The distance from the utility pole to the center of the driveway is 83 feet. Zone B will be somewhat closer than this, and the center of Zone A will be slightly further away.

Monitoring times for this location are 7:00 a.m. to 8:00 p.m. on weekdays only. Monitoring should commence on Monday, September 16, at approximately noon and continue through Friday, September 20, at 8:00 p.m., then resume on Monday, September 23 at 7:00 a.m. and continue until approximately noon that day.

South Star Urgent Care, Monroe

South Star Urgent Care is located at 4015 Sterlington Road in Monroe. It has an entrance and an exit, both off Sterlington Road. If traffic obeys the directional arrows, entering traffic is in the driveway to the north of the facility, and exiting traffic is in the driveway to the south. However, traffic moving in the wrong direction is possible in both driveways. The SMATS radar and CountCAM4 can again be co-located on a utility pole on the far side of Sterlington Road, as shown in Figure 68 in the blue circle.

Figure 68. South Star Urgent Care, Monroe

The counting zones are shown in red. Zone A is for entering traffic in the entrance driveway, and Zone D is for traffic entering the exit driveway. Similarly, Zone B is for exiting traffic in the exit driveway, while Zone C is for traffic exiting from the entrance driveway. The utility pole is located 58 feet from the entrance driveway and 88 feet from the exit driveway. The position for the CountCam4 is not ideal, as it will be looking head on at entering traffic and at an angle for exiting traffic. However, there are no alternative poles on the west side of Sterlington Road, which would have been ideal.

Monitoring times for this location should be from 7:30 a.m. to 8:30 p.m. on weekdays only. Monitoring should commence on Monday, September 16, at approximately noon until Friday, September 20, at 8:30 p.m., then resume on Monday, September 23, at 7:30 a.m. and continue until approximately noon that day.

Accessing the Sites

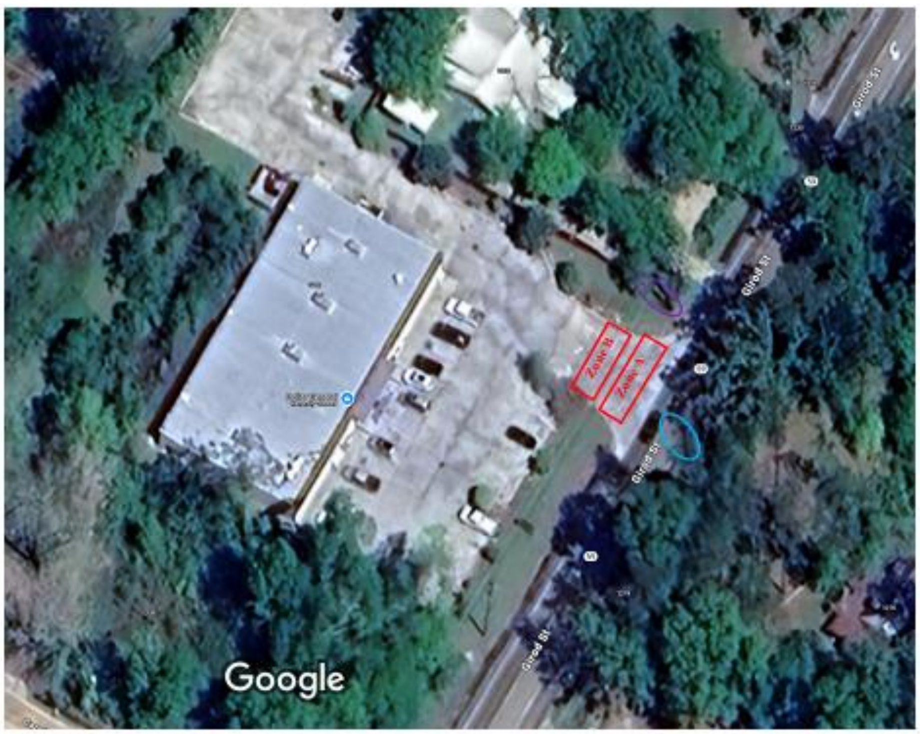
Using I-20, these two locations are approximately 38 minutes apart. It will take approximately 3 hours and 30 minutes to reach Rocketfast Carwash from LTRC, then 38-40 minutes to reach South Star Urgent Care. It is then 3 hours and 45 minutes to return to LTRC. Therefore, to have these two locations set up on Monday morning, it will require departing LTRC at approximately 6:30 a.m. This should allow Rocketfast Carwash to be set up by approximately 11:00 a.m. and South Star Urgent Care by approximately 12:30 p.m. The team's return to LTRC would be at approximately 4:15 p.m.

Week 6: Dollar General, Mandeville, and New Orleans Original Daiquiris, Covington

Dollar General, Mandeville

The Dollar General on LA 59/Girod Street in Mandeville is a simple location with a single entrance and exit on LA 59. There is a utility pole almost opposite the entrance/exit on which the SMATS radar device can be located, as shown in Figure 69 and indicated in the blue circle. This pole is approximately 35 feet from the center of the driveway. The counting zones are shown in red. Zone A is for entering traffic, and Zone B is for exiting traffic.

Figure 69. Dollar General, Mandeville



The CountCAM4 camera should be located on the utility pole on the opposite side of the road, shown in a purple circle in Figure 69. The camera should be aimed across the driveway and be high so that, as far as possible, large trucks entering the parking lot will not entirely mask exiting cars.

Monitoring for this location should be from 6:30 a.m. until 9:00 p.m. on weekdays only. Note that the store is open until 10:00 p.m., but traffic after 9:00 p.m. is not of interest. Monitoring should commence on Tuesday, September 24, at approximately noon and continue until Friday, September 27, at 9:00 p.m., then resume on Monday, October 1, at 6:30 a.m. and continue until approximately noon on Tuesday, October 2.

New Orleans Original Daiquiris, Covington

This business is located at 2700 North Highway US 190 in Covington. This location is somewhat challenging. The only usable utility pole for the SMATS radar is on the west side of US 190, as shown in Figure 70 by the blue circle. This pole is 232 feet from the entrance driveway and 251 feet from the exit driveway.

Figure 70. New Orleans Original Daiquiris, Covington

The counting zones are shown in red. Zones A and D are for entering vehicles, and Zones B and C are for exiting vehicles. There are no directional markers; therefore, we must assume that vehicles will enter and exit both driveways.

There is no convenient utility pole for mounting the CountCam4 camera, so it should be co-located with the SMATS radar device. Both devices need to be mounted as high as possible due to the distance from the driveways and to minimize interruptions from large trucks on US 190.

Monitoring times for this location should be from 10:30 a.m. until 9:00 p.m. on weekdays only. Monitoring should commence at approximately noon on Tuesday, September 24, and continue until 9:00 p.m. on Friday, September 27, then resume on Monday, October 1, at 10:30 a.m., and continue until approximately noon on Tuesday, October 2.

Accessing the Sites

These two sites are approximately 15 minutes apart. The travel time from LTRC to Dollar General is approximately 1 hour and 15 minutes. From the New Orleans Original Daiquiris, it is approximately 1 hour and 10 minutes back to LTRC. Therefore, departure from LTRC at approximately 8:30 a.m. should allow installation of the first SMATS device and camera at Dollar General by approximately 10:30 a.m. and installation at the New Orleans Original Daiquiris by approximately 11:30, with return to LTRC by approximately 1:00 p.m. For deinstallation, departure at approximately 11:00 a.m. should permit both devices to be uninstalled and returned to LTRC by approximately 2:00 p.m.

Week 7: Wacky Daiquiri and Tsunami Car Wash

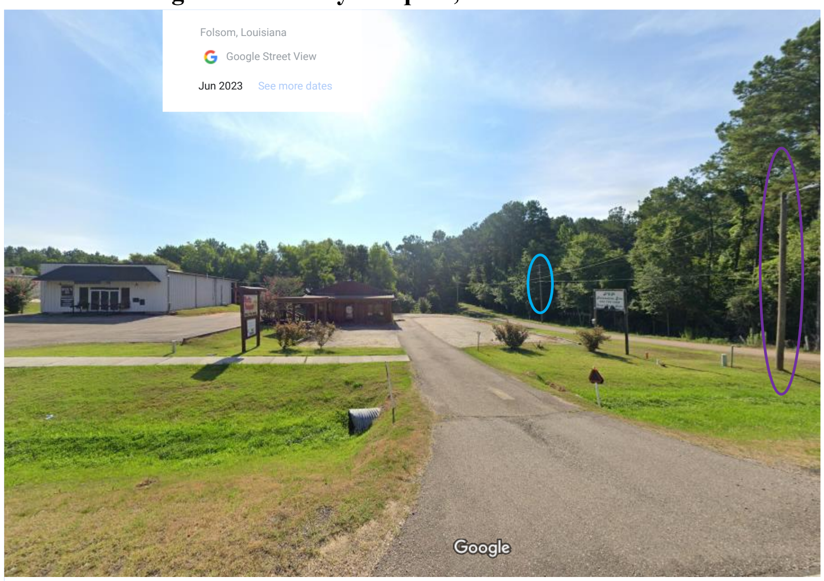
Wacky Daiquiri, Folsom

This site is located on the corner of LA 25 and Bill Dyess Road in Folsom. There are entrances/exits on both LA 25 and Bill Dyess Road. The available utility poles are not well-positioned for this site. The best pole, which is difficult to see in the Google Maps view, is located on the back boundary of the property. This is circled in blue in Figure 71. The counting Zones are shown in red in Figure 71. Zones B and C are for exiting traffic, and Zones A and D are for entering traffic. Zones C and D may present some difficulty because of the angle from the utility pole.

Figure 71. Wacky Daiquiri, Folsom

Figure 72 shows the utility pole for mounting the radar device more clearly. One CountCam4 could also be mounted on this pole, aimed across the driveway from Bill Dyess Road. A CountCAM4 camera should also be located on the utility pole circled in purple, aimed parallel to LA 25 and providing a view of traffic entering and exiting from LA 25. Monitoring of this site should be conducted on weekdays from 11:30 a.m. to 8:30 p.m. Monitoring should commence at noon on Wednesday, October 2, and continue until 8:30 p.m. on Friday, October 4, then resume at 11:30 a.m. on Monday, October 7, and continue until noon on Wednesday, October 9.

Figure 72. Wacky Daiquiri, Folsom street view



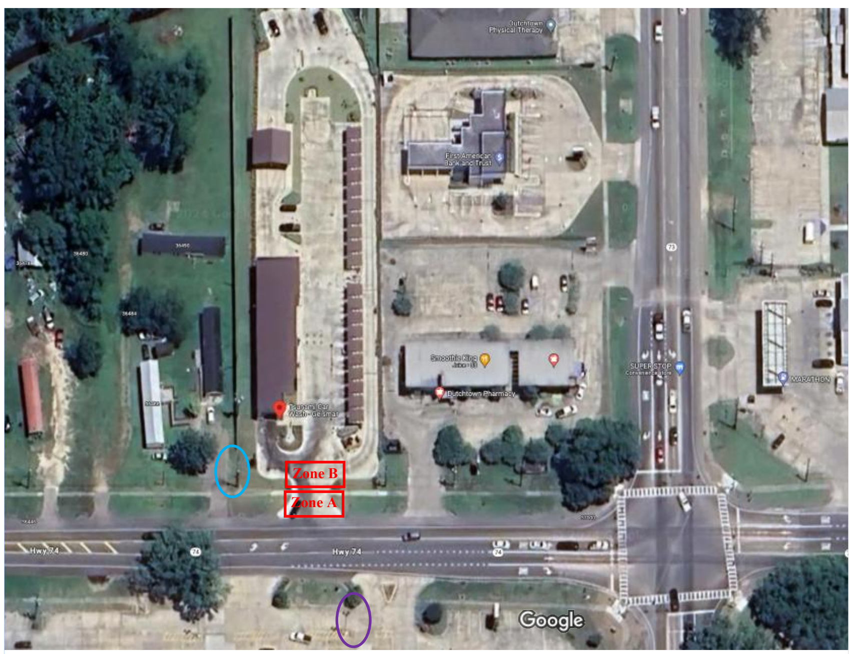
Tsunami Car Wash, Geismar

Tsunami Carwash is located on LA 74 in Geismar. It has a single entrance and exit, but the location of utility poles for use in measuring these are problematic. The only suitable one appears to be the one marked in a blue circle in Figure 73, because this has a better angle of view than the poles along LA 74. The counting zones are marked as Zone A for entering vehicles and Zone B for exiting vehicles. Zone B needs to be located far enough towards LA 74 to avoid counting vehicles that exit from the carwash building and make a U-turn into the vacuum bays. The utility pole circled in purple would be the best place to locate the video camera so that it can record vehicles entering and exiting the carwash. Monitoring of this site should be from 6:30 a.m. until 7:30 p.m. on weekdays only. Monitoring should commence at noon on Wednesday, October 2, and continue until Friday, October 4, at 7:30 p.m, then resume at 6:30 a.m. on Monday, October 7, and continue until noon on Wednesday, October 9.

Accessing the Sites

These two locations are not close to one another. Travel from LTRC to Tsunami Carwash will take approximately 30 minutes. Travel from Tsunami Carwash to Wacky Daiquiri will take 1 hour and 25 minutes via I-10 and I-12. It will then take 1 hour and 20 minutes to return to LTRC. Assuming that each location requires 45 minutes to set up, ideally this should be done by leaving LTRC at 8:30 a.m. and traveling to the carwash first. Leaving the carwash at approximately 9:45 a.m., arrival at Wacky Daquiri would be at approximately 11:10 a.m. This would allow both sites to be set up before noon on Wednesday, October 2. Return to LTRC would be by approximately 1:30 p.m. Deinstallation would require departing LTRC at approximately 11:30 a.m. on Wednesday, October 9, enabling the carwash site to be deinstalled at approximately noon. Deinstallation of the Wacky Daiquiri site would be completed by approximately 2:00 p.m., with return to LTRC by approximately 3:30 pm.

Figure 73. Tsunami Carwash, Geismar



Week 8: Regions Bank, Gonzales

Regions Bank, Gonzales

This is a large site on the corner of US 61 (Blues Highway/Airline Highway) and LA 429 (East Weber City Road). There are two entrances/exits, one on each of these major highways. The site is shown in Figure 74. This site requires two SMATS radar devices and two CountCAM4s. There are utility poles and light standards conveniently located for these.

US 61 Entrance/Exit

For the entrance/exit off US 61, the best location for the SMATS radar is on the light standard in the median strip opposite the entrance/exit, as marked in the blue circle. This is located 73 feet from the middle of the driveway to the bank. The suggested counting zones are indicated in red and marked as Zone A (entry) and Zone B (exit). The CountCAM4 camera for this driveway should be located on the utility pole to the northwest of the driveway, circled in purple. This is located 30 feet from the center of the driveway.

Figure 74. Regions Bank, Gonzales

LA 429 Entrance/Exit

For the entrance/exit off LA 429, the best location for the SMATS radar is the utility pole that is almost opposite the driveway, also circled in light blue. This is located 58 feet from the center of the driveway. The counting zones are shown in red and marked Zone C (entry) and Zone D (exit). It should be noted that some vehicles may exit the drive-thru windows and turn left at the island to either park in the parking areas to the west of the site or exit to US 61. These vehicles should not be counted at this location. The utility pole circled in purple to the east of this driveway would be ideal for locating the CountCAM4. This pole is 66 feet from the center of the driveway.

This site should be monitored from 8:30 a.m. to 5:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Thursday, October 10, and continue until 5:30 p.m. on Friday, October 11, then resume at 8:30 a.m. on Monday, October 14, and continue until approximately noon on Thursday, October 17. Given the CountCam4's short battery life and the proximity of this site to LTRC, it may be a good idea to plan to replace the cameras at the beginning of Monday, October 14, to obtain additional video for verification.

Accessing the Site

This location can be reached in approximately 35 minutes from LTRC via I-10 and US 61. Departure to the site should be at approximately 9:30 a.m. on Thursday, October 10, which should enable both locations to be set up before noon. For deinstallation, departure from LTRC at approximately 11:30 am on Thursday, October 17 should permit both devices to be retrieved in the early afternoon.

Week 9: Indigo Park Apartment Complex

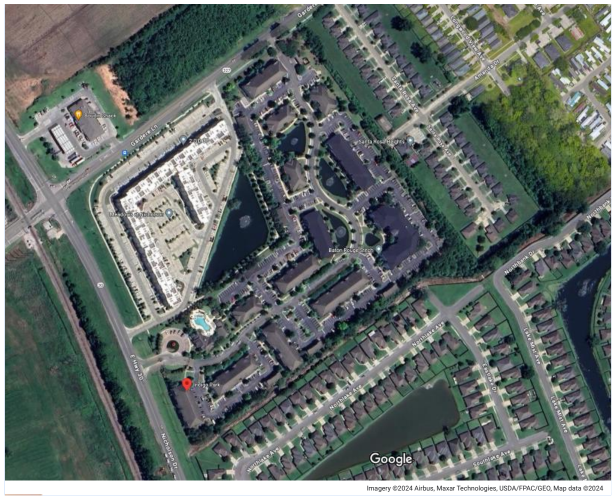
Indigo Park Apartment Complex, Baton Rouge

This apartment complex is located near the corner of Gardere Lane and Nicholson Drive, although another apartment complex is actually on the corner. There are two entrances/exits to this complex, one on Nicholson Drive and one on Gardere Lane. The main entrance/exit is the one on Nicholson. The complex is shown in Figure 75.

Nicholson Drive Entrance/Exit

This entrance/exit has no utility poles across the road. They are located on the same side of the road as the apartment complex. The best location is shown in a blue circle in Figure 76. The counting zones are shown in red, with Zone A for entering traffic and Zone B for exiting traffic. The pole is approximately 64 feet from the gateway's center. It is approximately 28 feet from the center of the nearer driveway for the video camera.

Figure 75. Indigo Park Apartment Complex, Baton Rouge



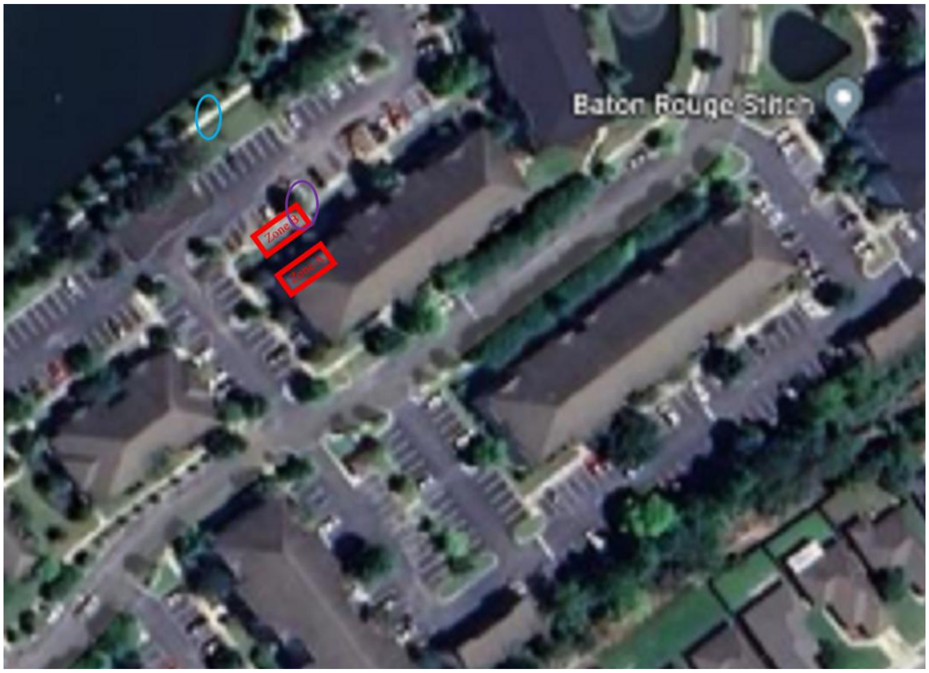
The CountCAM4 camera should be located on the same utility pole, but angled at right angles to the driveway.

Figure 76. Indigo Park Apartment Complex, Baton Rouge, Nicholson Drive entrance/exit

Gardere Lane Entry/Exit

The Gardere Lane Entry/exit is shown in Figure 77. There is a utility pole opposite the driveway that will be the best candidate for mounting the SMATS radar device. This is circled in blue. It is approximately 110 feet from the center of the driveway entrance/exit. The counting zones are marked in red, with Zone B for exiting vehicles and Zone A for entering vehicles.

Figure 77. Indigo Park Apartment Complex, Baton Rouge, Gardere Lane entrance/exit



There is a utility pole just north of this driveway on the same side of Gardere Lane as the apartment complex, which would be ideal for locating the CountCAM4. This is circled in purple and is approximately 28 feet from the center of the driveway.

This site should be measured from 6:30 a.m. until 7:30 p.m. on weekdays only. Measurement will commence at noon on Friday, October 18, and continue until 7:30 p.m., then resume at 6:30 a.m. on Monday, October 21, and continue until noon on Friday, October 25.

Accessing the Site
Indigo Park is located just 10 minutes from LTRC on Nicholson Drive. Departure from LTRC at approximately 10:20 am should allow time to set up both SMATS devices and the video camera by noon. Departure from LTRC at noon on October 25 will allow deinstallation shortly after noon.

Week 10: Dollar General, Sterlington, and Dollar General, West Monroe

Dollar General, Sterlington
Dollar General is located on the south side of LA 2 in Sterlington. This site does not have utility poles in good locations. There are three potential locations to mount cameras, as shown in Figure 78. The preferred pole is shown with a solid blue line and is 180 feet from the center of the entrance/exit driveway, while the two alternative locations are shown with a dotted blue line.

Figure 78. Dollar General, Sterlington

The two red boxes are the counting zones: the one closest to LA 2 for exiting vehicles, and the one nearest the store for entering vehicles, assuming we are using the utility pole in the solid circle.

The utility pole circled in purple would be best for the CountCAM4 installation, where the camera would be aimed across the driveway. This is 91 feet from the center of the driveway.

Measurement at this location should be from 7:30 a.m. until 8:30 p.m. on weekdays only. Measurement will start at noon on Monday, October 28, and continue until at 8:30 p.m. on Friday, November 1, then resume at 7:30 a.m. on Monday, November 4, until and continue until noon.

Dollar General, West Monroe

Dollar General is located on the east side of LA 143/Whites Ferry Road in West Monroe. The utility poles are not ideally located, but the best one is at the corner of Whites Ferry Road and Halsell Drive. It is shown in Figure 79. The utility pole is circled in blue. The count zones are shown in red. The one nearer to the road should be for exiting vehicles, and the further one for entering vehicles. The angle from the utility pole is not ideal and may lead to some counting issues. It is 137 feet from the center of the driveway. Unfortunately, there does not appear to be a better alternative.

Figure 79. Dollar General, West Monroe

The utility pole circled in purple would be the best location for the video camera to be installed. This pole is 47 feet from the center of the driveway, so it should provide a good location for the manual counts.

Measurement of this facility should be from 6:30 a.m. to 8:30 p.m. on weekdays, with measurement commencing at noon on Monday, October 28, and continuing until Friday, November 1, at 8:30 p.m. Measurement should resume at 6:30 a.m. on Monday, November 4, and continue until approximately noon.

Accessing the Sites

It will take 3 hours and 45 minutes to travel from LTRC to the Dollar General in West Monroe. It will then take 30 minutes to travel to the Dollar General in Sterlington. It will take 3 hours and 35 minutes to return to LTRC. Having both sites operational by noon on Monday will require departing from LTRC by 7:00 a.m., arriving at the Dollar General in West Monroe at approximately 10:45 a.m., proceeding to the Dollar General in Sterlington by approximately 11:30 a.m., and returning to LTRC by approximately 4:00 p.m. For deinstallation, departure from LTRC would be at approximately 8:15 a.m., and return would be at approximately 4:45 pm.

Week 11: New Orleans Original Daiquiri, Gonzales, and Swamp Shack Daiquiris

New Orleans Original Daiquiri, Gonzales

This site is located on LA 30 West in Gonzales, near the I-10 and LA 30 interchange. The site has two adjacent driveways that are not marked as in or out, but are presumably available for both maneuvers. This will require four count zones. The site is shown in Figure 80.
There is a utility pole across LA 30 from the site that should work for the SMATS radar. It is circled in blue on Figure 80. It is 127 feet from the east driveway and 110 feet from the west driveway. The counting zones are shown in red for entering and exiting traffic. Zones A and C are for exiting traffic, and Zones B and D are for entering traffic.

The best location for the CountCAM4 camera is on the utility pole circled in purple. This is 41 feet and 101 feet from the center of the two driveways. The camera should be aimed across the driveways.

Measurement at this location should be from 10:30 a.m. until 9:00 p.m. on weekdays only. Measurement would begin at approximately 10:30 a.m. on Wednesday, November 6, and continue until Friday, November 8, at 9:00 p.m., then resume on Monday, November 11, at 10:30 a.m. and continue until Tuesday, November 12, at 9:00 p.m.

Figure 80. New Orleans Original Daiquiri, Gonzales

Swamp Shack Daiquiris, Port Allen

This site is located on LA 76 at LA 415 in Port Allen. It has a single entrance, as shown in Figure 81. The best utility pole to use for mounting the SMATS radar is the one circled in blue. As shown, this is 80 feet from the entrance to the daiquiri shop. The counting zones are shown in red. Zone A is for entering traffic, and Zone B is for exiting traffic.

The best location for the CountCAM4 camera is on the second utility pole with the SMATS radar, aiming it across the driveway. It needs to be on the second pole to give it sufficient distance from the driveway.

Measurement at this site should be from 1:00 p.m. to 9:00 p.m. on weekdays only. Note that the shop opens at 2:00 p.m., except on Fridays, when it opens at 1:00 p.m. Counting should commence at 1:00 p.m. on Wednesday, November 6, and continue until Friday, November 8, at 9:00 p.m., then resume on Monday, November 11, at 1:00 p.m. and continue until Tuesday, November 12, at 9:00 p.m.

Figure 81. Swamp Shack Daiquiris, Port Allen

Accessing the Sites

Installation should be done at New Orleans Original Daiquiri first, because counting begins earlier there. From LTRC, it is 30 minutes to this location, so departure at approximately 8:30 a.m. should allow installation to be completed before 10:30 a.m. Travel from Gonzales to Port Allen will take 30 minutes, so departure from Gonzales at 10:30 a.m. would allow installation to commence in Port Allen at 11:00 a.m., and the SMATS radar will be in place in time to start measurement at 1:00 p.m. Deinstallation would take place on Wednesday, November 11, as early in the day as is convenient.

Note that because measurement is only required from late morning in Gonzales and in the afternoon for Port Allen, five working days of data can be obtained from Wednesday through Tuesday.

Week 12: Rocky's Premier Auto Wash, Hammond, and Acadian Village Apartment Complex

Rocky's Premier Auto Wash, Hammond

This site is located on West University Avenue in Hammond. It has a single driveway entrance and exit, as shown in Figure 82. The best location for the radar device is on the utility pole circled in light blue. The counting zones are shown in red in Figure 82. The utility pole is 102 feet from the middle of the driveway. Zone A is for entering vehicles, and Zone B is for exiting vehicles. The CountCAM4 camera should be co-located with the radar device.

Figure 82. Rocky's Premier Auto Wash, Hammond

This site should be monitored from 7:00 a.m. to 7:30 p.m. on weekdays only. Monitoring will commence on Thursday, November 14, at approximately noon and continue until Friday, November 15, at 7:30 p.m. It will resume at 7:00 a.m. on Monday, November 18, and continue until approximately noon on Thursday, November 21.

Acadian Village Apartment Complex, Covington

This apartment complex is located at 71153 LA 21 in Covington. It has a single entrance/exit, as shown in Figure 83. The utility pole circled in pale blue is the best location for the radar. It is 170 feet from the driveway. The red boxes, A (entering traffic) and B (exiting traffic), are the counting locations. The camera should be co-located with the radar device.

Figure 83. Acadian Village Apartment Complex, Covington

Measurement of this site should commence at 6:00 a.m. and continue until 9:00 p.m. on weekdays only. Monitoring should commence at approximately noon on Thursday, November 14, and continue until 9:00 p.m. on Friday, November 15, then resume at 6:00 a.m. on Monday, November 18, and continue until approximately noon on Thursday, November 21.

Accessing the Sites

It will take approximately 1 hour and 10 minutes to reach Acadian Village from LTRC. It will then take approximately 30 minutes to get to Rocky's Premier Auto Wash, and from there, it is 50 minutes back to LTRC. Assuming it will take approximately an hour to install at each location, departure from LTRC should be at approximately 8:15 a.m. This will allow installation at Acadian Village at approximately 9:30 a.m., arrival at Rocky's at 11:00 a.m., and completion of installation by noon. For deinstallation, departure from LTRC should be at approximately 10:45 am, allowing Acadian Village to be deinstalled first at noon.

Week 13: Louisiana National Bank

Louisiana National Bank, Ruston

This site is located on North Trenton Street in Ruston. There are two entrances/exits from Trenton Street, which pose some challenges for locating the radar devices. The site is shown in Figure 84.

Figure 84. Louisiana National Bank, Ruston

There is a utility pole convenient for the south driveway, circled in light blue. It is 120 feet from the middle of the south driveway. The counting zones for this driveway are shown as Zone A for exiting traffic and Zone B for entering traffic.

The north driveway is much more difficult, because there is no utility pole in the ideal location. The only one available appears to be the one circled in medium blue. It is 139 feet from the center of the north driveway, but the angle is not optimal. The counting zones are shown as Zone C for entering traffic and Zone D for exiting traffic.

The CountCAM4 video cameras should be located on the two utility poles circled in purple. The south utility pole is 35 feet from the center of the driveway, while the north pole is 88 feet from the center of the north driveway.

This location should be monitored from 8:30 a.m. until 5:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Thursday, January 9, and continue until 5:30 p.m. on Friday, January 10, then resume at 8:30 a.m. on Monday, January 13, and continue until approximately noon on Thursday, January 16.

Accessing the Site

It will take approximately 3 hours and 45 minutes to reach this site from LTRC. Therefore, it will be necessary to leave LTRC at approximately 7:30 a.m. on Thursday, January 9, to install the devices. This should allow both installations to be completed by noon. Deinstallation should be completed by departing from LTRC on Thursday, January 16, at approximately 8:30 am, allowing it to be completed by 1:00 p.m. and returning to LTRC by about 4:45 pm.

Week 14: Benny's Car Wash and Rocky's Premier Auto Wash, Hammond

Benny's Car Wash, Baton Rouge

This site is located on Siegen Lane in Baton Rouge. The site has a single driveway from Siegen Lane, and no other land use is served by it, as shown in Figure 85. There is a utility pole that is convenient for this driveway and is circled in light blue. It is 148 feet from the middle of the driveway. The counting zones for this driveway are shown as Zone A for exiting traffic and Zone B for entering traffic.

Figure 85. Benny's Car Wash, Baton Rouge

The CountCAM4 video camera should be located on the utility pole circled in purple. This utility pole is 135 feet from the center of the driveway. It is closer to the pole that is to the north of the driveway.

This location should be monitored from 6:30 a.m. until 8:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Friday, January 17, and continue until 8:30 p.m. on Friday, January 17, then resume at 6:30 a.m. on Monday, January 20, and continue until approximately noon on Friday, January 24.

Rocky's Premier Auto Wash, Hammond

This site is located on West University Avenue in Hammond. It has a single driveway entrance and exit, as shown in Figure 86. The best location for the radar device is on the utility pole circled in light blue. The counting zones are shown in red in Figure 86. The utility pole is 102 feet from the middle of the driveway. Zone A is for entering vehicles, and Zone B is for exiting vehicles. The CountCAM4 camera should be co-located with the radar device.

Figure 86. Rocky's Premier Auto Wash, Hammond

This site should be monitored from 7:00 a.m. to 7:30 p.m. on weekdays only. Monitoring will commence on Friday, January 17, at approximately noon and will continue until 7:30 p.m. on Friday, January 17 at 7:30 p.m. It will resume at 7:00 a.m. on Monday, January 20, and continue until approximately noon on Friday, January 24.

Accessing the Sites

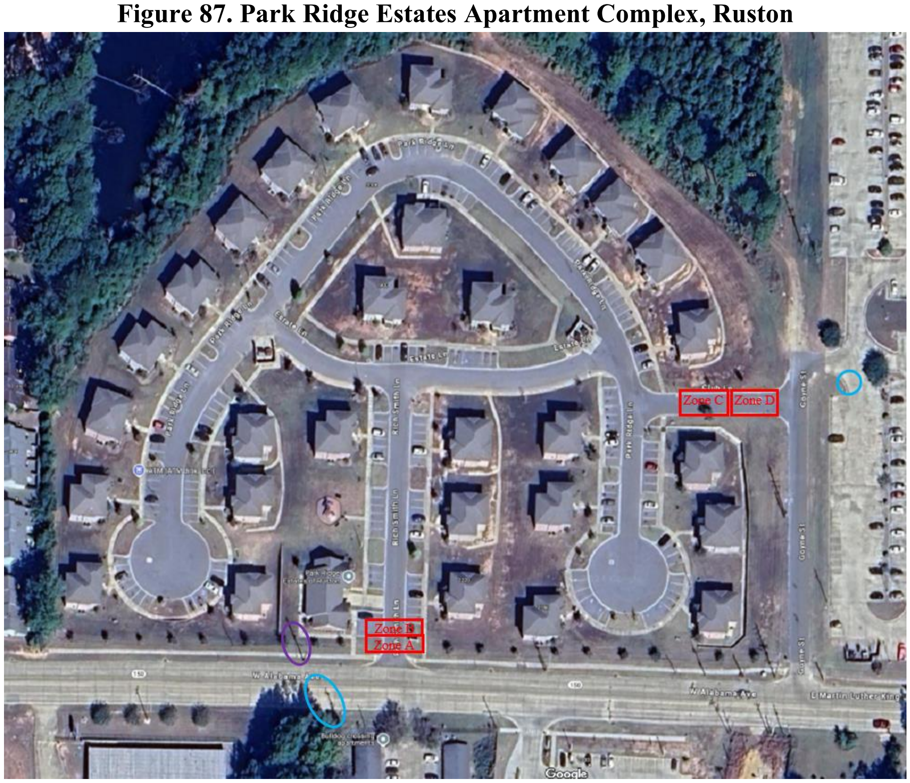
It will take approximately 20 minutes to get to Benny's Car Wash from LTRC. It will take 46 minutes to travel from Benny's to Rocky's. Therefore, it would require leaving LTRC at approximately 9:30 a.m. on Friday, January 20, arriving at Benny's at approximately 9:50 a.m. Leaving Benny's at 10:30 a.m. would enable arriving at Rocky's by approximately 11:15 a.m., so installation should be complete by noon. Deinstallation would require leaving LTRC at approximately 11:15 a.m. on Friday, January 24, traveling to Rocky's in Hammond to deinstall, then returning to Benny's to deinstall and return to LTRC at approximately 3:00 p.m.

Week 15: Park Ridge Estates Apartment Complex

Park Ridge Estates Apartment Complex, Ruston

This site is located on West Alabama Avenue in Ruston. The site may have two entrances, one from West Alabama Avenue and one from Goyne Street, as shown in Figure 87. The latter entrance is to be confirmed by ground inspection prior to Week 15.

Figure 87. Park Ridge Estates Apartment Complex, Ruston



There is a utility pole that could be used for the West Alabama Avenue driveway on the opposite side of the road from the driveway, circled in light blue at the bottom of the picture. It is 108 feet from the middle of the driveway. The counting zones for this driveway are shown in red. The closest one should be for entering traffic, and the further one for exiting traffic. This radar should be mounted at six meters due to potential traffic on West Alabama Avenue. The second radar, if needed, will need to be on the LTRC trailer, where the blue circle is shown on the right of the picture. It is 90 feet from the driveway and should be mounted at three meters. The two counting zones are shown for entering and exiting traffic.

Two CountCAM4 cameras are required for this site. One should be mounted on the utility pole just west of the driveway from West Alabama Avenue, circled in purple. The second should be co-located with the radar on the LTRC trailer. The cameras are 106 and 90 feet from the centers of their respective driveways.

This location should be monitored from 6:30 a.m. until 7:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Monday, January 27, and continue until 7:30 p.m. on Friday, January 31, then resume at 6:30 a.m. on Monday, February 3, and continue until approximately noon on Monday, February 3.

Accessing the Site

It will take approximately 3 hours and 50 minutes to reach Park Ridge Estates from LTRC. Therefore, it would require leaving LTRC at approximately 7:30 a.m. on Monday, January 27, and arriving at the site at approximately 11:20 am. Deinstallation would require leaving LTRC at 8:00 a.m. on Monday, February 3, before returning to LTRC at approximately 4:30 pm.

Week 16: Dollar General, Robert, and Bayou Boil N Geaux

Dollar General, Robert

This site is located on US 190 in Robert, as shown in Figure 88. There is a single driveway, and there is nothing near the site that should complicate its measurement. US 190 is a two-lane road at this location and should not have a high volume of traffic.

There is a utility pole that is convenient for this driveway and is circled in light blue. It is 121 feet from the middle of the driveway. Mounting at three meters should be sufficient. The counting zones for this driveway are shown as Zone A for exiting traffic and Zone B for entering traffic.

The CountCAM4 video camera should be located on the utility pole circled in purple. This utility pole is 48 feet from the center of the driveway.

This location should be monitored from 7:30 a.m. until 8:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Tuesday, February 4, and continue until 8:30 p.m. on Friday, February 7, then resume at 8:30 a.m. on Monday, February 10, and continue until approximately noon on Tuesday, February 11.

Figure 88. Dollar General, Robert

Bayou Boil N Geaux, Covington

This site is located on US 190 in Covington. It has a single driveway entrance and exit, as shown in Figure 89. The best location for the radar device is on the LTRC trailer, located where the dark blue circle is shown on the median of US 190. This will put the radar approximately 73 feet from the driveway. Mounting as high as possible on the trailer is best, because the traffic on US 190 may be quite heavy. Zone A is for entering vehicles, and Zone B is for exiting vehicles. The CountCAM4 camera should be located on the light/utility pole circled in purple. This is approximately 28 feet from the middle of the driveway.

Figure 89. Bayou Boil N Geaux, Covington

This site should be monitored from 10:30 a.m. to 7:30 p.m. on weekdays only. Monitoring will commence at approximately noon on Tuesday, February 4, and continue until 7:30 p.m. on Friday, February 7, then resume at 10:30 a.m. on Monday, February 10, and continue until approximately noon on Tuesday, February 11.

Accessing the Sites

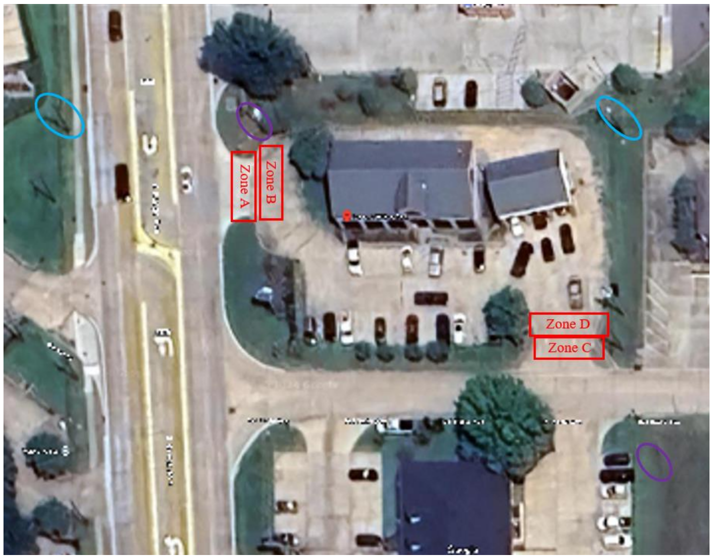
It will take approximately 1 hour to get to the Dollar General in Robert from LTRC. It will take 25 minutes to travel from Dollar General to Bayou Boil N Geaux. Therefore, it would require leaving LTRC at approximately 9:00 a.m. on Tuesday, February 4, to get to Dollar General at approximately 10:00 a.m. Leaving there at 11:00 a.m. would permit arriving at Bayou Boil N Geaux by approximately 11:25 a.m., so installation should be complete by noon. Deinstallation would require leaving LTRC at 11:00 a.m. on Tuesday, February 11, going to Dollar General in Robert to deinstall, then traveling to Bayou Boil N Geaux to deinstall, and returning to LTRC at approximately 2:30 p.m.

Week 17: Hancock Whitney Bank

Hancock Whitney Bank, Denham Springs

This site is located on South Range Avenue in Denham Springs. The site has two entrances, one from South Range Avenue and one from Del Norte Avenue, as shown in Figure 90.

Figure 90. Hancock Whitney Bank, Denham Springs



There is a utility pole that could be used for the Range Avenue entrance on the opposite side of the road from the driveway, circled in light blue on the left of the picture. It is 97 feet from the middle of the driveway. The counting zones for this driveway are shown as Zone A for exiting traffic and Zone B for entering traffic. This radar should be mounted at six meters due to traffic on Range Avenue. The second radar should be mounted on the utility pole at the rear of the bank, facing the Del Norte Avenue entrance. It is 120 feet from the driveway and should be mounted at three meters. Zone D should be for entering traffic and Zone C for exiting traffic.

Two CountCAM4 cameras are required for this site. One should be mounted on the utility pole just north of the driveway from South Range Avenue, circled in purple. The second should be on the utility pole to the east of the Del Norte Avenue driveway, also circled in purple. The cameras are 34 and 33 feet from the centers of their respective driveways.

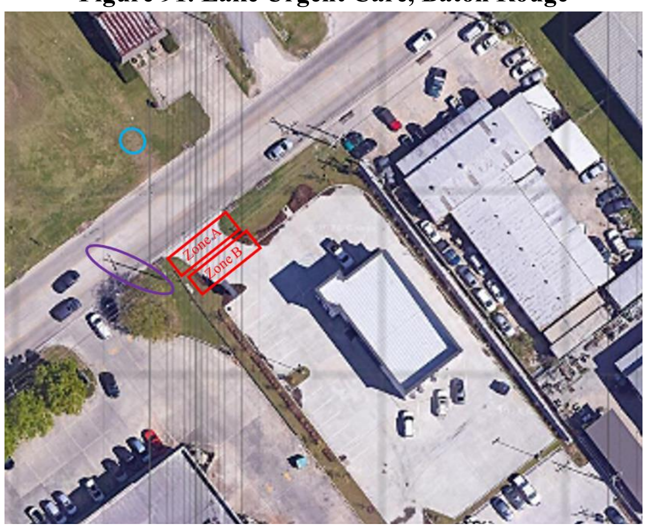
This location should be monitored from 8:45 a.m. until 4:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Wednesday, February 12, and continue until 4:30 p.m. on Friday, February 14, then resume at 8:45 a.m. on Monday, February 17, and continue until approximately noon on Wednesday, February 19.

Accessing the Site
It will take approximately 25 minutes to get to the Hancock Whitney Bank from LTRC. Therefore, it would require leaving LTRC at approximately 10:30 a.m. on Wednesday, February 12, to get to the bank at approximately 11:00 am. Deinstallation would require leaving LTRC at 11:30 a.m. on Wednesday, February 19, before returning to LTRC at approximately 1:00 p.m.

Week 18: Lake Urgent Care, Baton Rouge, and New Orleans Original Daiquiri, Gonzales

Lake Urgent Care, Baton Rouge
This site is located at 20152 Highland Road in Baton Rouge. The site is on a two-lane road, but there are no utility poles opposite the site. The site is shown in Figure 91.

Figure 91. Lake Urgent Care, Baton Rouge



The LTRC trailer will need to be used for this site and located approximately where the light blue circle appears opposite the driveway. It is approximately 55 feet from the middle of the driveway. The counting zones for this driveway are shown in red. The closest one should be for entering traffic, and the further one for exiting traffic. This radar should be mounted at three to four meters.

A CountCAM4 camera should be mounted on the utility pole just west of the driveway, circled in purple. The camera will be approximately 23 feet from the center of the driveway. This location should be monitored from 7:30 a.m. until 6:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Thursday, February 20, and continue until 6:30 p.m. on

Friday, February 21, then resume at 7:30 a.m. on Monday, February 24, and continue until approximately noon on Thursday, February 27.

New Orleans Original Daiquiri, Gonzales

New Orleans Original Daiquiri is located at 1810 LA 30 in Gonzales. The site is shown in Figure 92. Although there are no signs or driveway markings, it is likely that traffic will enter predominantly through the east driveway and exit through the west driveway. However, this cannot be guaranteed.

Figure 92. New Orleans Original Daiquiris, Gonzales

There is a utility pole opposite the west driveway that is suitable for mounting the radar device. This pole is located approximately 77 feet from the center of the west driveway and 104 feet from the center of the east driveway. The counting Zones are A and D for exiting traffic and C and B for entering traffic. The CountCAM4 camera should be mounted on the utility pole circled in purple. This pole is 46 feet from the center of the east driveway and 108 feet from the center of the west driveway.

Monitoring should be done for this site from 10:30 a.m. until 8:30 p.m. on weekdays only. Therefore, monitoring should begin at approximately noon on Thursday, February 20, and continue until 8:30 p.m. on Friday, February 21, then resume at 10:30 a.m. on Monday, February 24, and continue until approximately noon on Thursday, February 27.

Accessing the Sites

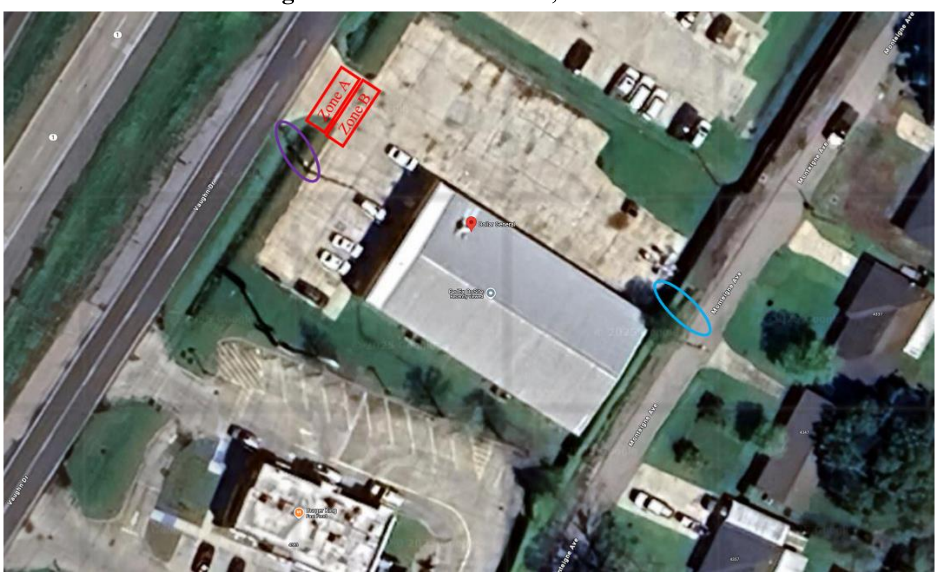
It will take approximately 20 minutes to get to Lake Urgent Care from LTRC, then 20 minutes to get from Lake Urgent Care to New Orleans Original Daiquiri. Therefore, it would require leaving LTRC at approximately 10:00 a.m. on Thursday, February 2, to reach Lake Urgent Care at approximately 10:20 a.m., then proceed to New Orleans Original Daiquiri and arrive at approximately 11:30 a.m. Return to LTRC would take approximately 30 minutes. Deinstallation would require leaving LTRC at 11:30 a.m. on Thursday, February 27, and deinstalling at Lake Urgent Care first, then continuing to New Orleans Original Daiquiri before returning to LTRC at approximately 2:00 p.m.

Week 19: Dollar General, Port Allen, and Regions Bank, Zachary

Dollar General, Port Allen

This site is located at 4393 LA 1 South in Port Allen. The site is on a two-lane service road, Vaughn Road, parallel to LA 1, as shown in Figure 93.

Figure 93. Dollar General, Port Allen



There is a utility pole and a street light on the back border of the property shown in Figure 93. They are approximately 210 feet from the middle of the driveway. Either could be used for mounting the radar. The counting zones for this driveway are shown in red in the driveway. The closest one (B) should be for entering traffic, and the further one (A) for exiting traffic. The radar should be mounted at four and a half meters to ensure that entering vehicles do not block the radar. A CountCAM4 camera should be mounted on the utility pole south of the driveway, circled in purple. The camera will be approximately 38 feet from the center of the driveway.

This location should be monitored from 7:45 a.m. until 8:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Monday, March 10, and continue until 8:30 p.m. on

Friday, March 14, then resume at 7:45 a.m. on Monday, March 17, and continue until approximately noon on Monday, March 17.

Regions Bank, Zachary

The Regions Bank is located at 4919 Main Street in Zachary. The site is shown in Figure 94. It has two driveways, with the one to the east (right) clearly marked as an entrance and the one to the west (left) clearly marked as an exit, with “no entry” signs facing the street.

Figure 94. Regions Bank, Zachary

The best location for the radar is on the LTRC trailer parked at the back of the parking lot shown by the blue circle. Zone A is for entering traffic, and Zone B is for exiting traffic. Because of the building, the radar should be mounted at six to seven meters. The CountCAM4 camera should be mounted on the light pole circled in purple. This pole is 50 feet from the center of the east driveway and 137 feet from the center of the west driveway. Alternatively, a second CountCAM4 could be mounted on the light pole to the west of the exit driveway to provide better video for exiting traffic.

Monitoring should be done for this site from 8:45 a.m. until 5:15 p.m. on weekdays only. Therefore, monitoring should begin at approximately noon on Monday, March 10, and continue until 5:15 p.m. on Friday, March 14, then resume at 8:45 a.m. on Monday, March 17, and continue until approximately noon on Monday, March 17.

Accessing the Sites

It will take approximately 15 minutes to get to the Dollar General from LTRC, then 30 minutes to get from Dollar General to Regions Bank. Therefore, it would require leaving LTRC at approximately 9:30 a.m. on Monday, March 14, arriving at Dollar General at approximately 9:45 a.m., then proceeding to Regions Bank and arriving at approximately 11:15 am. Return to LTRC would take approximately 35 minutes. Deinstallation would require leaving LTRC at 11:45 a.m. on Monday, March 17, and deinstalling at the Dollar General first, proceeding to Regions Bank before returning to LTRC at approximately 2:00 pm.

Week 20: Pelican Pointe Car Wash and Brookstone Park Apartment Complex

Pelican Pointe Car Wash, Mandeville

This site is located on Florida Street in Mandeville. The site has a single driveway from Florida Street, but may also have access from the McDonald's driveway along the north side of the car wash, as shown in Figure 95.

Figure 95. Pelican Pointe Car Wash, Mandeville

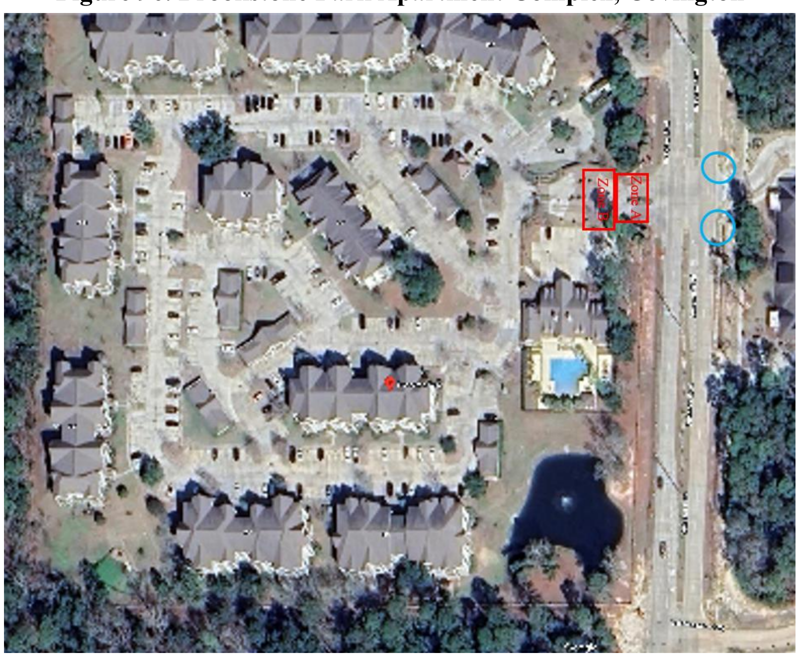
There is a utility pole that is possible for this driveway, hidden in Figure 95 by the large tree and is circled in light blue. It is 104 feet from the middle of the driveway. The counting zones for this driveway are shown as Zone A for exiting traffic and Zone B for entering traffic. If possible, another counting zone for entering traffic at Zone C should be used. This will cover vehicles entering from the McDonald's driveway to the north of the building. This zone must be north of the exit from the car wash tunnel, so as not to count vehicles progressing through the tunnel. The radar should be mounted at six meters for this location. The CountCAM4 video camera should be located on the utility pole circled in purple. This utility pole is 55 feet from the center of the driveway.

This location should be monitored from 7:00 a.m. until 7:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Tuesday, March 18, and continue until 7:30 p.m. on Friday, March 21, then resume at 7:00 a.m. on Monday, March 24, and continue until approximately noon on Tuesday, March 25.

Brookstone Park Apartment Complex, Covington

This is located on Ochsner Boulevard, a four-lane divided highway in Covington. It has a single driveway entrance and exit, as shown in Figure 96. The best location for the radar device is on the LTRC trailer in one of the two locations circled in light blue. The counting zones are shown in red in Figure 96, with Zone A for entering vehicles and Zone B for exiting vehicles. The CountCAM4 camera should be co-located with the radar device.

Figure 96. Brookstone Park Apartment Complex, Covington



This site should be monitored from 6:30 a.m. to 7:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Tuesday, March 18, and continue until 7:30 p.m. on Friday, March 21, then resume at 6:30 a.m. on Monday, March 24, and continue until approximately noon on Tuesday, March 25.

Accessing the Site

It will take approximately 1 hour and 10 minutes to get to the Pelican Pointe Car Wash from LTRC. It will take 20 minutes to get from Pelican Pointe to Brookstone Park. Therefore, it would require leaving LTRC at approximately 8:50 a.m. on Tuesday, March 18, to get to Pelican Pointe at approximately 10:00 a.m. Leaving there at 10:55 a.m. would permit arriving at Brookstone Park by approximately 11:15 a.m., so installation should be complete by noon. Deinstallation would require leaving LTRC at 10:45 a.m. on Tuesday, March 25, going to Pelican Pointe in Mandeville to deinstall there, then proceeding to Brookstone Park to deinstall there, and returning to LTRC at approximately 2:00 p.m.

Week 21: Dollar General, Prairieville, and First Guaranty Bank

Dollar General, Prairieville

This site is located at 16208 N Burnside Avenue (LA 44) in Prairieville. The site is on a two-lane road and is shown in Figure 97.

Figure 97. Dollar General, Prairieville

There is a utility pole under the trees approximately where the pale blue circle is shown in Figure 97. It is approximately 70 feet from the middle of the driveway. The counting zones for this driveway are shown red in the driveway. The closest one (A) should be for entering traffic and the further one (B) for exiting traffic. The radar should be mounted at three meters.

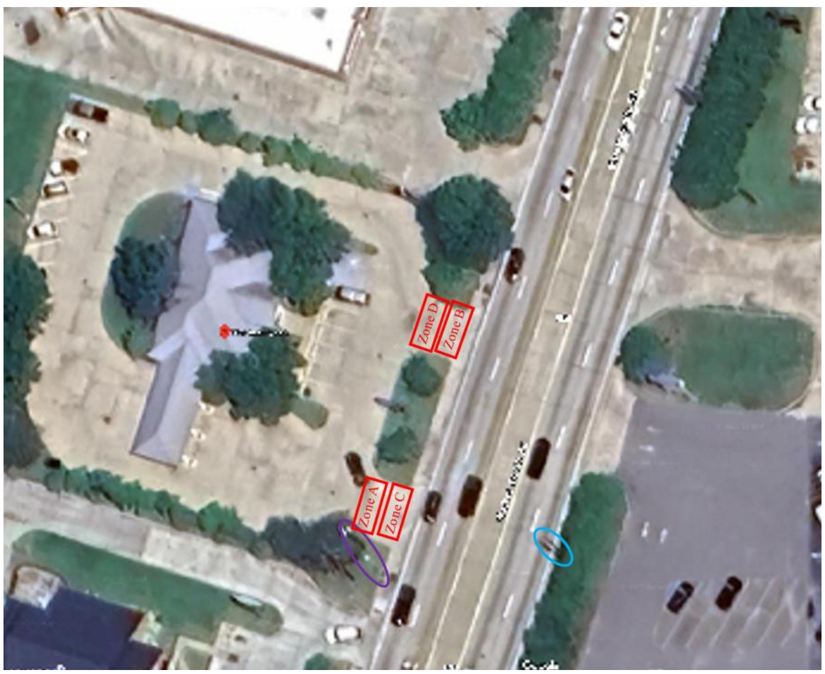
A CountCAM4 camera should be mounted on the utility pole south of the driveway, circled in purple. The camera will be approximately 100 feet from the center of the driveway. This is further than is ideal, but there is nothing else available.

This location should be monitored from 7:30 a.m. until 8:30 p.m. on weekdays only. Monitoring should commence at approximately noon on Wednesday, March 26, and continue until 8:30 p.m. on Friday, March 28, then resume at 7:30 a.m. on Monday, March 31, and continue until approximately noon on Wednesday, April 2.

First Guaranty Bank, Walker

First Guaranty Bank is located at 29815 Walker Road South in Walker. The site is shown in Figure 98. It has two driveways, both of which can be used for entering and exiting.

Figure 98. First Guaranty Bank, Walker



There is a utility pole opposite the south driveway that is suitable for mounting the radar device. This pole is located approximately 83 feet from the center of the south driveway and 117 feet from the center of the north driveway. The counting Zones are A and D for exiting traffic and C and B for entering traffic. Because Walker Road South is a four-lane roadway with a center turning lane, the radar should be mounted at six meters. Also, it should be noted that the drive-thru, which is likely the busiest entrance and exit, is served best by the south driveway. The CountCAM4 camera should be mounted on the utility pole circled in purple. This pole is 35 feet from the center of the south driveway and 122 feet from the center of the north driveway.

Monitoring should be done for this site from 8:00 a.m. until 5:00 p.m. on weekdays only, except on Fridays, when it should be monitored from 8:00 a.m. until 5:30 p.m. Therefore, monitoring should begin at approximately noon on Wednesday, March 26, and continue until 5:30 p.m. on Friday, March 28, then resume at 8:00 a.m. on Monday, March 31, and continue until approximately noon on Wednesday, April 2.

Accessing the Sites

It will take approximately 30 minutes to get to First Guaranty Bank from LTRC, then 30 minutes to get from First Guaranty Bank to Dollar General. Therefore, it would require leaving LTRC at approximately 9:30 a.m. on Wednesday, March 26, to reach First Guaranty Bank at approximately 10:00 a.m., then proceed to Dollar General and arrive at approximately 11:30 a.m. Return to LTRC would take approximately 35 minutes. Deinstallation would require leaving LTRC at 11:30 a.m. on Wednesday, April 2, and deinstalling at First Guaranty Bank, then proceeding to Dollar General before returning to LTRC at approximately 2:00 p.m.

Week 22: Lake Urgent Care, Denham Springs, and Ron's Seafood Market

Lake Urgent Care, Denham Springs

This site is located at 8249 Vincent Road in Denham Springs. The site is on a five-lane road and is shown in Figure 99.

There are no utility poles on the south side of Vincent Road, so this site will need to use the LTRC trailer. It should be located approximately in the blue circle, opposite the driveway to the urgent care site, and on the public right of way to the south of Vincent Road. This location is approximately 95 feet from the middle of the driveway. The counting zones for this driveway are shown in red in the driveway. The closest one (A) should be for entering traffic, and the further one (B) for exiting traffic. The radar should be mounted at six meters to ensure that traffic on Vincent Road does not block the radar.

Figure 99. Lake Urgent Care, Denham Springs

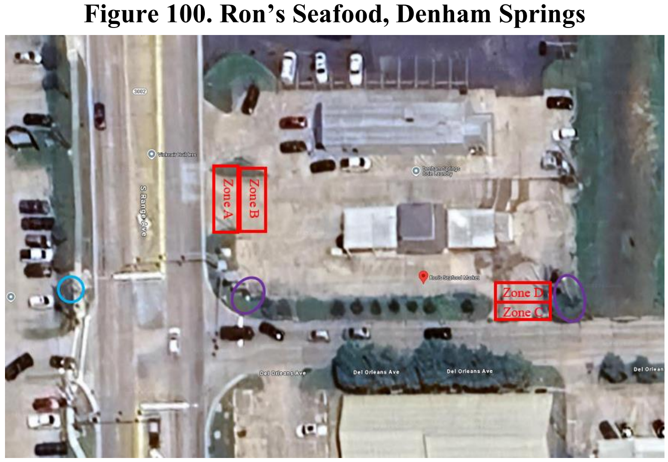
A CountCAM4 camera should be mounted on the utility pole east of the driveway, circled in purple. The camera will be approximately 46 feet from the center of the driveway.

This location should be monitored from 7:45 a.m. until 8:15 p.m. on weekdays only. Monitoring should commence at approximately noon on Thursday, April 3, and continue until 8:15 p.m. on Friday, April 4, then resume at 7:45 a.m. on Monday, April 7, and continue until approximately noon on Thursday, April 10.

Ron's Seafood Market, Denham Springs

Ron's Seafood Market is located at 1160 South Range Avenue in Denham Springs. The site is shown in Figure 100. It has two driveways, one from Range Avenue and one from Del Orleans Avenue.

Figure 100. Ron's Seafood, Denham Springs



The traffic signals at the intersection of Del Orleans Avenue and South Range Avenue are the best option for mounting the radar, although the traffic signals have been changed since the pictures available from Google Maps. The counting Zones are A and C for entering traffic and B and D for exiting traffic. Because of the traffic on South Range Avenue, the radar should be mounted at six meters. One CountCAM4 camera should be mounted on the traffic light pole circled in purple to the south of the driveway, and one should be mounted on the utility pole on Del Orleans Avenue to the east of the driveway, also circled in purple. The first pole is 26 feet from the center of the Range Avenue driveway, and the second is 30 feet from the center of the east driveway from Del Orleans Avenue.

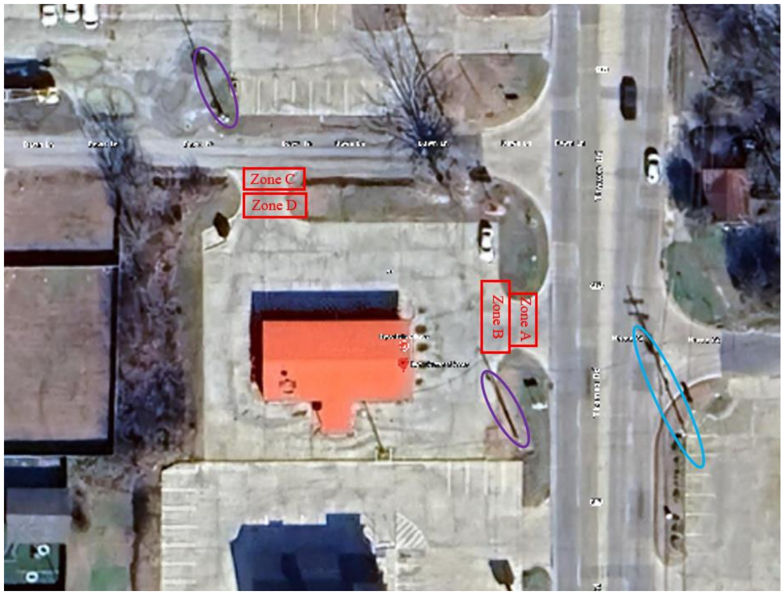
Monitoring should be done for this site from 9:45 a.m. until 8:15 p.m. on weekdays only. Therefore, monitoring should begin at approximately noon on Thursday, April 3, and continue until 8:15 p.m. on Friday, April 4, then resume at 9:45 a.m. on Monday, April 7, and continue until approximately noon on Thursday, April 10.

Accessing the Sites
It will take approximately 25 minutes to get to Lake Urgent Care from LTRC, then less than 10 minutes to get from Lake Urgent Care to Ron's Seafood. Therefore, it would require leaving LTRC at approximately 9:30 a.m. on Thursday, April 3, to get to Lake Urgent Care at approximately 10:00 a.m., before proceeding to Ron's Seafood and arriving at approximately 11:15 a.m. Return to LTRC would take approximately 25 minutes. Deinstallation would require leaving LTRC at 11:30 a.m. on Thursday, April 10, deinstalling at Lake Urgent Care first, then proceeding to Ron's Seafood to deinstall there before returning to LTRC at approximately 1:30 p.m.

Week 23: Bayou Butts and Booze and Rocketfast Carwash, West Monroe

Bayou Butts and Booze, Brownsville-Bawcomville
This site is located at 600 Thomas Road in Brownsville-Bawcomville. The site is on a five-lane road and is shown in Figure 101. There are two entrances to the site, one from Thomas Road and one from Dawn Lane.

Figure 101. Bayou Butts and Booze, Brownsville-Bawcomville



Because the building is only one story tall, it should be possible to cover both entrances/exits from one radar device mounted on the utility pole on Thomas Road, circled in purple. This location is approximately 100 feet from the middle of the driveway from Thomas Road and 247 feet from the middle of the driveway on Dawn Lane. The counting zones for these driveways are shown in red. The closest one (A) should be for entering traffic and the further one (B) for exiting traffic for Thomas Road. For Dawn Lane, C is for exiting traffic and D for entering traffic. The radar should be mounted at six meters to ensure that traffic on Thomas Road does not block the radar.

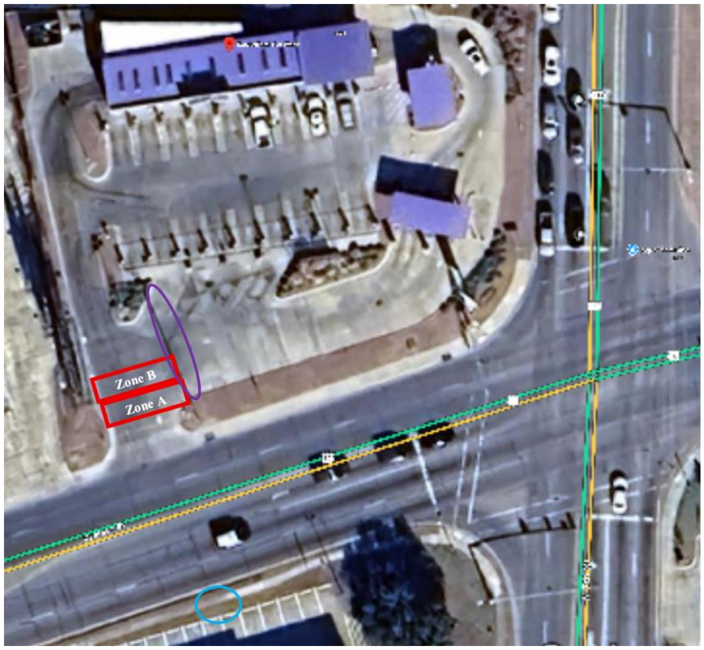
A CountCam4 camera should be mounted on the utility pole south of the driveway on Thomas Road, circled in purple. This camera will be approximately 59 feet from the center of the driveway. On Dawn Lane, the CountCam4 must be mounted on the pole to the northwest of the driveway, also circled in purple. This is not ideal, as it must look into the driveway, but it is the only location available. It is 43 feet from the center of the driveway on Dawn Lane.

This location should be monitored from 8:45 a.m. until 8:15 p.m. on weekdays only. Monitoring should commence at approximately noon on Monday, April 21, and continue until 8:15 p.m. on Friday, April 25, then resume at 8:45 a.m. on Monday, April 28, and continue until approximately noon on Monday, April 28.

Rocketfast Carwash, West Monroe

Rocketfast Carwash in West Monroe is located at 2900 Cypress Street in West Monroe, at the intersection with North 7th Street. It is shown in Figure 102.

Figure 102. Rocketfast Carwash, West Monroe



There are no available utility poles opposite the entrance and exit, so it will require the LTRC trailer to be used and positioned in the Entergy parking lot, if possible, where the blue circle is shown in Figure 102. The best location for the CountCAM4 camera is on the utility pole circled in purple, which is right beside the entrance and exit. The counting zones are shown as Zone A and Zone B.

This site should be monitored from 7:15 a.m. to 7:45 p.m. Monitoring should commence on Monday, April 21, at noon and continue until Friday, April 25, at 7:45 p.m., then resume on Monday, April 28, at 7:15 a.m. and continue until noon on the same day.

Accessing the Sites

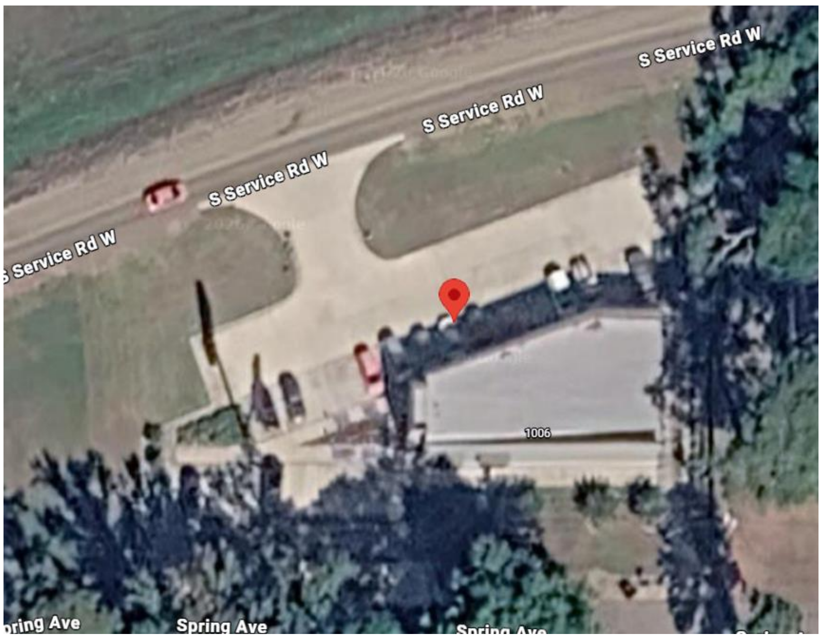
It will take approximately 3 hours and 30 minutes to get to the Rocketfast Carwash from LTRC, then less than 10 minutes to get from there to Bayou Butts and Booze. Therefore, it would require leaving LTRC at approximately 7:00 a.m. on Monday, April 21, to arrive at Rocketfast Carwash at approximately 10:30 a.m., then proceed to Bayou Butts and Booze and arrive at approximately 11:15 a.m. Return to LTRC would take approximately 3 hours and 25 minutes. Deinstallation would require leaving LTRC at 8:00 a.m. on Monday, April 28, deinstalling at Rocketfast Carwash first, then proceeding to Bayou Butts and Booze to deinstall there before returning to LTRC at approximately 4:00 p.m.

Week 24: Coastal Urgent Care

Coastal Urgent Care, Ruston

This site is located at 1009 South Service Rd West, along a two-lane road, as shown in **Error! Reference source not found.**03. There are two parking areas, one accessed from S Service Rd West and another from Spring Avenue.

Figure 103. Coastal Urgent Care, Ruston



The best location for the radar device is on the LTRC trailer located where the dark blue circle is shown on Figure 103. This will put the radar approximately 70 feet from the driveway. The recommended radar location is on a steep slope. Therefore, the radar should be mounted at the highest possible position within the operational height limits. Zone A is for entering vehicles, and Zone B is for exiting vehicles. The CountCam4 should be mounted on the trailer for verifying radar counts.

Since no suitable pole is available to install a radar for vehicle counting in the parking area on Spring Avenue, and only one trailer is available at LTRC and is already being used at the first location, no radar will be used to count vehicles entering or exiting this parking area. This parking area is likely used by very few vehicles, mostly service vehicles. Therefore, a CountCam4 should be installed on the utility pole circled in yellow, as it will be used for manual vehicle counting entering or exiting the parking area on Spring Avenue.

This location should be monitored from 7:30 a.m. until 8:30 p.m. on weekdays only. Monitoring should start at approximately noon on Tuesday, April 29, and continue until 8:30 p.m. on Friday, May 2, then resume at 7:30 a.m. on Monday, May 5, and continue until approximately noon on Tuesday, May 6.

Accessing the Site

It will take approximately 4 hours to travel from LTRC to the Urgent Care site in Ruston. Therefore, departure from LTRC would need to be at approximately 7:00 a.m. on Tuesday, April 29, with arrival at approximately 11:00 a.m., so that installation can be completed by noon. For deinstallation, departure from LTRC would be at approximately 8:00 a.m. on Tuesday, May 6, with deinstallation at the site and return to LTRC at approximately 4:30 p.m.

Week 25: Ashford Place Apartment Complex

Ashford Place Apartment Complex, West Monroe

This site requires two radar devices to monitor because of the distance between the two entrances/exits. One is required for Ashford Drive and one for Netherlands Street.

Location on Ashford Drive

There are no utility poles near the entrance from Ashford Drive. This entrance should be measured using the LTRC trailer positioned across from it, as shown in the blue circle in Figure 103. The video camera will need to be co-located with the SMATS radar, because there are no usable poles in this vicinity. The counting zones should be set up as shown in Figure 103, with Zone A for entering vehicles and Zone B for exiting vehicles.

Figure 104. Ashford Place Apartment Complex, West Monroe, Ashford Drive entrance

Location on Netherlands Street

For the Netherlands Street location, there is a utility pole that is ideally located directly across from the entrance to the apartment complex, as shown in Figure 104. The SMATS radar should be mounted on the utility pole on the opposite side of Netherlands Street, as shown circled in blue. This is 64 feet from the entrance. The counting zones should be set up as shown, with Zone A for entering traffic and Zone B for exiting traffic. The video camera should be located on the utility pole circled in purple. It is located just 32 feet from the center of the entrance.

Figure 105. Ashford Place Apartment Complex, West Monroe, Netherlands Street entrance

Measurement for this site should be from 6:30 a.m. until 8:00 p.m. on weekdays only. Monitoring should commence at noon on Wednesday, May 7, and continue until 8:00 p.m. on Friday, May 9, then resume at 6:30 a.m. on Monday, May 12, and continue until noon on Wednesday, May 14.

Accessing the Site

According to Google Maps, it will take 3 hours and 34 minutes to get from LTRC to Ashford Place apartment complex via Blues Highway and US 425 N. To have these two radar devices set up in time to begin recording at noon, those leaving from LTRC will need to depart at approximately 7:00 a.m. Similarly, for deinstallation, it will be necessary to leave LTRC by 8:30 a.m. to begin deinstallation at approximately noon.

Week 26: Manchac Lake Apartment Complex

Manchac Lake Apartments, Prairieville

This site requires two radar devices to monitor because of the distance between the two entrances/exits. Both are located on Airline Highway.

There are no utility poles near the south entrance from Airline Highway. This entrance would be measured best by using the LTRC trailer positioned across from the entrance, as shown in the blue circle in Figure 105. This location is approximately 200 feet from the entrance/exit. The radar should be mounted at six meters because of the traffic on Airline Highway. The video camera for this location can be mounted on the utility pole circled in purple. The counting zones should be set up as shown in Figure 105, with Zone C for entering vehicles and Zone D for exiting vehicles.

Figure 106. Manchac Lake Apartment Complex, Prairieville

Placing the trailer in the median would have been preferable, but the median is a drainage ditch and does not appear to offer a level surface for the trailer.

For the north entrance, there is a utility pole opposite the entrance, circled in blue in Figure 105. This pole is approximately 220 feet from the entrance to the driveway and approximately 305 feet from the center of the measurement zones. The radar should be mounted at six meters because of the traffic on Airline Highway, or as high as feasible on the utility pole in question. The measurement zones for this location are Zone A for entering vehicles and Zone B for exiting vehicles. It is important that these zones are between Airline Highway and the entrance to the parking area on the north side of this driveway. The CountCAM4 camera will need to be co-located with the radar because no poles are available near this entrance.

Measurement for this site should be from 6:30 a.m. until 8:00 p.m. on weekdays only. Monitoring should commence at noon on Thursday, May 15, and continue until 8:00 p.m. on Friday, May 16, then resume at 6:30 a.m. on Monday, May 19, and continue until noon on Thursday, May 22.

Accessing the Site

According to Google Maps, it will take approximately 25 minutes to get from LTRC to Manchac Lake Apartment Complex. To have these two radar devices set up in time to begin recording at noon, those leaving LTRC must depart at approximately 10:30 a.m. For deinstallation, it will be necessary to leave LTRC by approximately 11:30 am to start deinstallation at approximately noon.

Appendix C: Verification Reports for All 38 Sites

Introduction

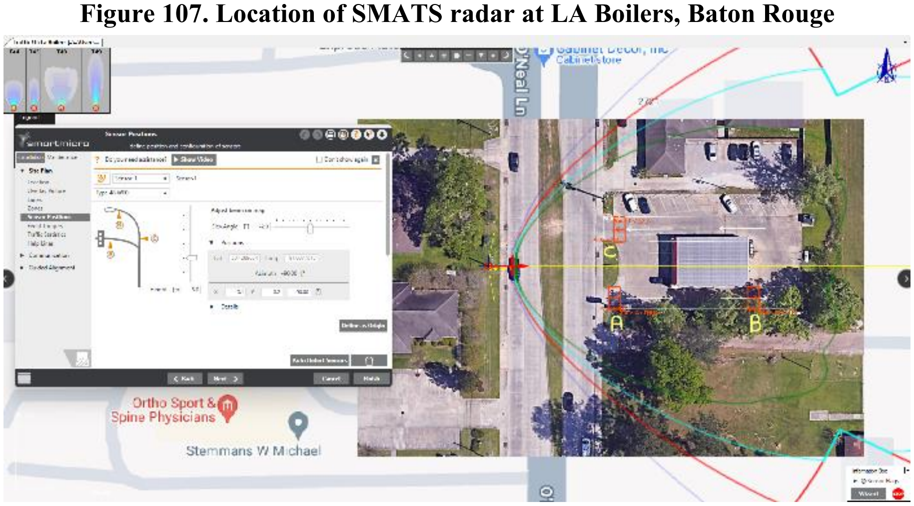
In this Appendix, the verification results for each site are provided in detail. For sites that were measured with the smart micro-radar, counts are available for every 15 minutes, and the verification checks were performed using these 15-minute periods. However, for sites where video was processed by the YOLO computer vision software, the software at the time of this work only provided counts by hour. Therefore, only comparisons by hour are possible for these sites.

Week 1 Data Verification Checks for LA Boilers and Lake Urgent Care, Hammond

LA Boilers, Baton Rouge

Figure 106 shows the location of the SMATS radar for the LA Boilers Boil Shop in Baton Rouge, which was mounted three meters above ground. The radar counted entrances (Zone A and Zone B) and exits (Zone C) from the boil shop. Six hours were chosen for verification counts: two in the morning, two in the afternoon, and two in the evening. One camera was used to record video for this location.

Figure 107. Location of SMATS radar at LA Boilers, Baton Rouge



The counts by radar and from the videos are shown in Table 72. This shows that the video counts are generally very close or identical, but there are significant differences between the video counts and the radar counts. To compute the accuracy of the radar counts, because the radar counts were almost invariably higher, the comparison was made against the highest of the two video counts.

As can be seen, the in counts are reasonably accurate, generally being on the order of 100 to 120% accurate and always overcounting. The exit counts, on the other hand, are much less accurate, ranging from 106.25 to 200% accurate. The most likely reason for the inaccuracy of the exit counts is placing the counting zone too close to the main highway. The accuracy of the Zone B counts cannot be determined because the camera could not count the number of patrons who used the drive-thru rather than parking and then leaving.

Table 71. Comparison of visual and radar counts for LA Boilers, Baton Rouge

Location height 3 m		SMATS radar counts			Visual counts	
		Zone A (In)	Zone B (In)	Zone C (Out)	In	Out
8/13/2024	14:00 to 14:15	0	0	0	0	0
	14:15 to 14:30	0	0	0	0	0
	14:30 to 14:45	0	0	1	0	1
	14:45 to 15:00	0	0	0	0	0
	15:00 to 15:15	0	1	0	0	0
	15:15 to 15:30	3	1	1	2	1
	15:30 to 15:45	0	1	5	1	2
	15:45 to 16:00	1	0	0	1	1
	Total	4	3	6	4	5
	Accuracy %	100%	?	120%		
8/14/2024	10:00 to 10:15	0	0	2	0	1
	10:15 to 10:30	2	1	1	1	1
	10:30 to 10:45	0	0	0	0	0
	10:45 to 11:00	0	0	0	0	0
	11:00 to 11:15	0	0	0	0	0
	11:15 to 11:30	1	1	1	0	0
	11:30 to 11:45	2	0	5	3	3
	11:45 to 12:00	1	0	3	1	1
	Total	6	2	12	5	6
	Accuracy %	120%	?	200%		
8/14/2024	17:00 to 17:15	1	1	1	1	4
	17:15 to 17:30	1	0	3	1	1
	17:30 to 17:45	1	0	3	1	1
	17:45 to 18:00	2	1	3	2	2
	18:00 to 18:15	2	2	3	2	2
	18:15 to 18:30	1	1	1	0	1
	18:30 to 18:45	4	0	1	1	1
	18:45 to 19:00	3	1	2	5	4
	Total	15	6	17	13	16
	Accuracy %	115.3%	?	106.25%		

Lake Urgent Care, Hammond

Figure 107 shows the location of the SMATS radar and two counting zones for Lake Urgent Care in Hammond. The SMATS radar was mounted three meters above ground on the utility pole shown. The radar counted entrances at Zone B and exits at Zone A. Six hours were again chosen for verification checks: two in the morning, two in the afternoon, and two in the evening. There was one video camera mounted at this location.

Figure 108. Lake Urgent Care, Hammond counting zones

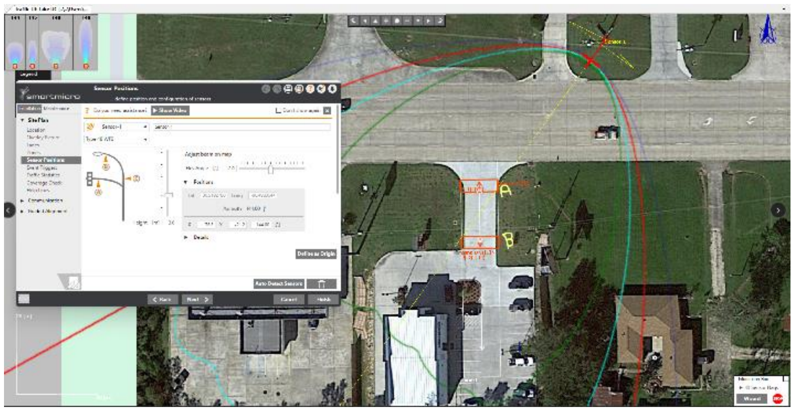


Table 73 shows the verification counts for the Lake Urgent Care radar device. Both the entering and exiting counts for the first period are poor, with an undercount of 50% for entering vehicles and an overcount of 127% for exiting vehicles. However, the later counts are much better, with the counts all being within 11% of the correct figures, and one period of entering vehicles being exactly the same for the radar and the video counts. Overall, these results are acceptable, though it would be useful to check a fourth two-hour period to see whether it aligns more with the morning results or the afternoon and evening results.

Table 72. Comparison of radar and visual counts for Lake Urgent Care, Hammond

Location height 3 m		SMATS radar counts		Visual counts	
		Zone B (In)	Zone A (Out)	In	Out
8/13/2024	10:00 to 10:15	1	3	2	3
	10:15 to 10:30	0	2	0	1
	10:30 to 10:45	0	2	1	1
	10:45 to 11:00	0	2	0	1
	11:00 to 11:15	0	1	1	0
	11:15 to 11:30	2	4	1	4
	11:30 to 11:45	0	0	0	0
	11:45 to 12:00	0	0	1	1
	Total	3	14	6	11
	Accuracy %	50%	127.3%		
8/13/2024	16:30 to 16:45	3	0	3	0
	16:45 to 17:00	0	0	1	1
	17:00 to 17:15	4	1	3	1
	17:15 to 17:30	2	6	1	5
	17:30 to 17:45	0	2	0	0
	17:45 to 18:00	0	2	0	1
	18:00 to 18:15	2	1	2	1
	18:15 to 18:30	2	0	3	2
	Total	13	12	13	11
	Accuracy %	100%	109.1%		
8/14/2024	13:00 to 13:15	1	2	1	2

Location height 3 m		SMATS radar counts		Visual counts	
		Zone B (In)	Zone A (Out)	In	Out
	13:15 to 13:30	0	0	2	0
	13:30 to 13:45	3	2	1	2
	13:45 to 14:00	1	2	2	2
	14:00 to 14:15	1	1	1	1
	14:15 to 14:30	1	0	1	0
	14:30 to 14:45	0	1	0	1
	14:45 to 15:00	2	1	2	1
	Total	9	8	10	9
	Accuracy %	90%	88.9%		

Week 2 Data Verification Checks

No verification checks were performed this week because the radar produced massively incorrect results, with phantom vehicles turning into the site. The results of this site were discarded and rescheduled to a later week.

Week 2 Data Verification Checks for Patient Plus Urgent Care (Remeasured)

Patient Plus Urgent Care, Baton Rouge, Plank Rd Entrance/Exit (S1)

Figure 108 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. An automated counting tool using YOLO was developed for vehicle counts. Table 74 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 100%, and for exiting counts, it is 97%.

Figure 109. Camera view at Plank Rd entrance/exit (S1)

Table 73. Comparison of automated counts and visual counts for Patient Plus Urgent Care, Baton Rouge, Plank Rd entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
03/11/2025	8:30-10:30	15	9	14	9	93	100
03/11/2025	12:00-14:00	10	18	11	18	110	100
03/11/2025	19:30-21:30	7	10	7	9	100	90
Total		32	37	32	36	100	97

Patient Plus Urgent Care, Baton Rouge, St Katherine Ave Entrance/Exit (S2)

Figure 109 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 75 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 92%, and for exiting counts, it is 91%.

Figure 110. Camera view at St Katherine Ave entrance/exit (S2)

Table 74. Comparison of automated counts and visual counts for Patient Plus Urgent Care, Baton Rouge, St Katherine Ave entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
03/11/2025	8:30-10:30	5	3	4	3	80	100
03/11/2025	12:00-14:00	8	4	8	3	100	75
03/11/2025	19:30-21:30	0	4	0	4	100	100
Total		13	11	12	10	92	91

Table 76 provides detailed comparisons of the visual and automated counts for each period, considering the combined totals from both sides (S1 and S2). The overall accuracy of the automated system, considering the combined totals from S1 and S2, is 98% for entering counts and 96% for exiting counts. Overall, the accuracy for both entering and exiting counts is accepted.

Table 75. Comparison of automated counts and visual counts for Patient Plus Urgent Care, Baton Rouge

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
03/11/2025	8:30-10:30	20	12	18	12	90	100
03/11/2025	12:00-14:00	18	22	19	21	106	95
03/11/2025	19:30-21:30	7	14	7	13	100	93
Total		45	48	44	46	98	96

Week 3 Data Verification Checks for Ouachita Valley Federal Credit Union

Ouachita Valley Federal Credit Union, Monroe, Louisville St Entrance/Exit

Figure 110 shows the location of the first SMATS radar, which was installed at a height of six meters. This radar was used to count entrances and exits, primarily from Zones A and B. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. The overall accuracy for entering counts is 91%, and for exiting counts, it is 92%. Table 77 provides more details on the vehicle counts for each hour and each timestamp. For an unknown reason, the data for August 8, 2024, at this location was not recorded by this radar, although it was recorded by the radar at Location 2. It was found that, despite the SMATS radar being positioned across a five-lane high-speed road, the zones were not affected by through vehicles. This could be due to the radar being mounted at a height of six meters in this case.

Figure 111. Position of the SMATS radar at Louisville St

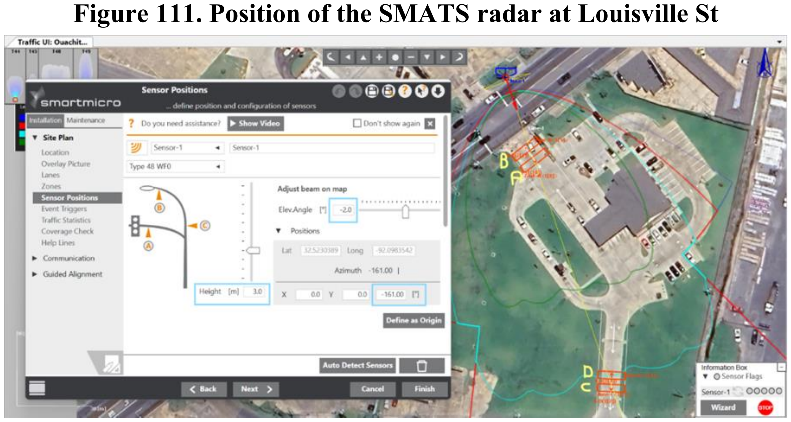


Table 76. Comparison of radar and visual counts for Ouachita Valley Federal Credit Union, Monroe, Louisville St entrance/exit

Location height 6 m		SMATS radar counts		Visual counts	
		Zone A (In)	**Zone B (Out)**	**In**	**Out**
8/29/2024	10:00 to 10:15	16	8	17	10
	10:15 to 10:30	12	7	14	7
	10:30 to 10:45	10	8	19	8
	10:45 to 11:00	12	7	18	10
	11:00 to 11:15	15	6	11	12
	11:15 to 11:30	9	6	13	7
	11:30 to 11:45	15	13	16	10
	11:45 to 12:00	16	8	14	9
	Total	105	63	122	73
	Accuracy %	86%	86%		
8/29/2024	14:00 to 14:15	13	6	9	6
	14:15 to 14:30	7	5	10	8
	14:30 to 14:45	14	7	15	6
	14:45 to 15:00	7	4	11	7
	15:00 to 15:15	10	6	12	3
	15:15 to 15:30	7	3	12	6
	15:30 to 15:45	13	7	11	7
	15:45 to 16:00	12	6	13	6
	Total	83	44	93	49
	Accuracy %	89%	90%		
8/29/2024	17:00 to 17:15	8	5	8	4
	17:15 to 17:30	12	6	11	6
	17:30 to 17:45	9	6	6	5
	17:45 to 18:00	5	4	6	5
	18:00 to 18:15	8	2	9	5
	18:15 to 18:30	4	4	2	4
	18:30 to 18:45	7	4	7	5
	18:45 to 19:00	4	5	6	2
	Total	57	36	55	36
	Accuracy %	104%	100%		

In conclusion, the overall accuracy for the entering and exiting zones is acceptable and should be addressed from Zone A for entry and Zone B for exit, respectively.

Ouachita Valley Federal Credit Union, Monroe, Newcombe St Entrance/Exit

Figure 111 shows the position of the second SMATS radar that was installed at a height of three meters at the Newcombe Street entrance/exit. This radar was used to count the number of vehicles entering and exiting from Zone C and Zone D, respectively. Three time periods were chosen for verification: morning, afternoon, and evening. The overall accuracy for the entering counts and the exiting counts were 103% and 102%, respectively. Table 78 provides further details for the vehicle counts at those two zones.

To sum up, the overall accuracy for the entering and exiting zones is acceptable and should be assessed for Zone C and Zone D, respectively.

Figure 112. Position of the SMATS radar at Newcombe St

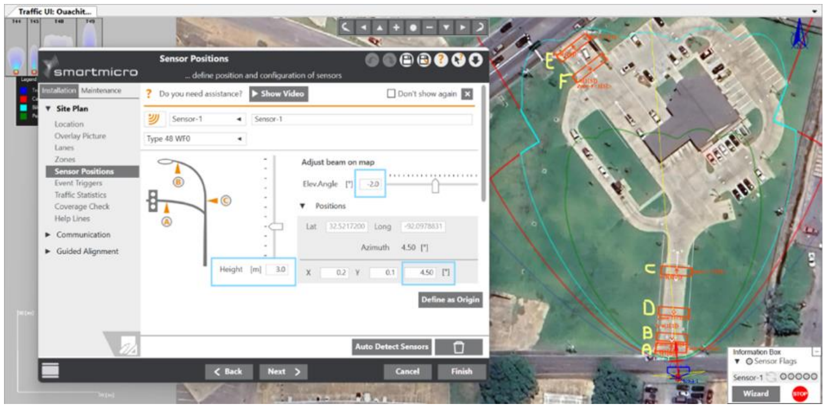


Table 77. Comparison of radar and visual counts for Ouachita Valley Federal Credit Union, Monroe, Newcombe St entrance/exit

Location height 3 m		SMATS radar counts		Visual counts	
		Zone A (In)	Zone B (Out)	In	Out
8/28/2024	14:00 to 14:15	5	2	5	7
	14:15 to 14:30	2	10	4	11
	14:30 to 14:45	4	7	3	5
	14:45 to 15:00	6	5	4	5
	15:00 to 15:15	1	6	2	9
	15:15 to 15:30	2	10	1	8
	15:30 to 15:45	1	4	2	3
	15:45 to 16:00	1	6	1	5
	Total	22	50	22	53
	Accuracy %	100%	94%		
8/29/2024	10:00 to 10:15	3	4	4	5
	10:15 to 10:30	4	11	4	15
	10:30 to 10:45	3	14	3	12
	10:45 to 11:00	3	11	3	9
	11:00 to 11:15	4	11	3	13
	11:15 to 11:30	3	12	4	8
	11:30 to 11:45	4	11	6	12
	11:45 to 12:00	9	13	5	13
	Total	33	87	32	87
	Accuracy %	103%	100%		
8/29/2024	17:00 to 17:15	2	16	2	15
	17:15 to 17:30	3	9	3	8
	17:30 to 17:45	4	10	3	13
	17:45 to 18:00	4	15	3	9
	18:00 to 18:15	2	6	1	7
	18:15 to 18:30	2	5	2	3
	18:30 to 18:45	2	1	4	1
	18:45 to 19:00		3		5
	Total	19	65	18	59
	Accuracy %	106%	110%		

Week 4 Data Verification Checks

No data were collected in Week 4 due to heavy rains that prevented the team from installing the radar and would likely have resulted in inaccurate counts.

Week 5 Data Verification Checks for Rocketfast Car Wash, Ruston, and South Star Urgent Care

Rocketfast Car Wash, Ruston

Figure 112 shows the location of the SMATS radar for the Rocketfast Car Wash in Ruston, which was mounted at six meters above ground. The radar counted entrances (Zone A) to and exits (Zone B) from the car wash. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. Both zones may have counts that are too high because vehicles were seen entering the car wash, driving into the vacuum bays, and traveling through the exit count zone (B) straight ahead to enter the car wash through Zone A. This will result in some double-counting. This is shown more clearly in Figure 113. A possible path for a vehicle is shown in this figure. Such movements were detected on the video several times.

Figure 113. Location of SMATS radar at Rocketfast Car Wash, Ruston

Figure 114. Detailed view of Rocketfast Car Wash, Ruston

Two cameras were used to record video for this location. Counts were made from both videos. There are discrepancies between the two, partly due to vehicle obstructions at certain times and partly because it is unclear whether the two cameras were fully synchronized. Most of the counts from the two cameras are identical or differ by only one vehicle.

The counts by radar and from the videos are shown in Table 79. This shows that the video counts are generally very close or identical, but there are significant differences between the video counts and the radar counts. To compute the accuracy of the radar counts, because the radar counts were almost invariably higher, the comparison was made against the highest of the two video counts.

Table 78. Comparison of visual and radar counts for Rocketfast Car Wash, Ruston

Location height 6 m		SMATS radar counts		Visual counts			
				Camera 1		Camera 2	
		Zone A (In)	Zone B (Out)	In	Out	In	Out
9/17/2024	8:00 to 8:15	16	15	13	11	13	12
	8:15 to 8:30	7	8	2	4	2	4
	8:30 to 8:45	12	3	8	5	8	5
	8:45 to 9:00	12	10	9	8	9	8
	9:00 to 9:15	5	9	8	10	8	11
	9:15 to 9:30	13	9	8	9	8	9
	9:30 to 9:45	7	9	6	8	5	8
	9:45 to 10:00	7	10	5	6	4	6
	Total	79	73	54	60	57	63
	Accuracy %	138.5%	115.9%				
9/17/2024	13:00 to 13:15	13	15	9	16	9	15
	13:15 to 13:30	15	12	14	8	14	8
	13:30 to 13:45	17	12	14	10	14	10
	13:45 to 14:00	14	14	10	14	10	14
	14:00 to 14:15	11	15	9	10	9	11
	14:15 to 14:30	7	8	8	9	9	8
	14:30 to 14:45	17	8	11	9	10	8
	14:45 to 15:00	11	15	7	9	7	8

Location height 6 m		SMATS radar counts		Visual counts			
				Camera 1		Camera 2	
	Total	105	99	82	85	82	82
	Accuracy %	128%	116.5%				
9/18/2024	16:00 to 16:15	9	15	11	9	10	9
	16:15 to 16:30	22	13	15	17	14	18
	16:30 to 16:45	11	6	11	6	11	6
	16:45 to 17:00	21	14	14	12	14	13
	17:00 to 17:15	9	19	5	12	5	12
	17:15 to 17:30	14	8	10	11	10	12
	17:30 to 17:45	14	5	17	5	17	6
	17:45 to 18:00	27	12	15	16	15	16
	Total	127	92	98	88	93	92
	Accuracy %	129.6%	100%				

The entering counts are not very accurate, generally in the range of 128 to 138% and always overcounting. The exit counts, on the other hand, are much closer, ranging from 116.5 to 100% accurate. The reasons for overcounting are at least in part due to vehicles that entered the car wash, used a vacuum bay, then drove back through the exit and into the entrance again.

South Star Urgent Care, Monroe

Figure 114 shows the location of the SMATS radar and six counting zones for South Star Urgent Care in Monroe. The SMATS radar was mounted three meters above ground on the utility pole shown. The radar counted entrances at Zones B, C, E, and F, and exits at Zones A and D. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. There were two video cameras mounted at this location, one to the south of the urgent care facility and one to the north. The north camera ran out of battery power in the early afternoon of September 19, so only the south camera was used for the final set of verification checks. However, the counts from the video cameras were identical for almost all four hours used prior to September 19, so there is no loss to the verification from the absence of video from that camera.

Figure 115. South Star Urgent Care, Monroe, counting zones

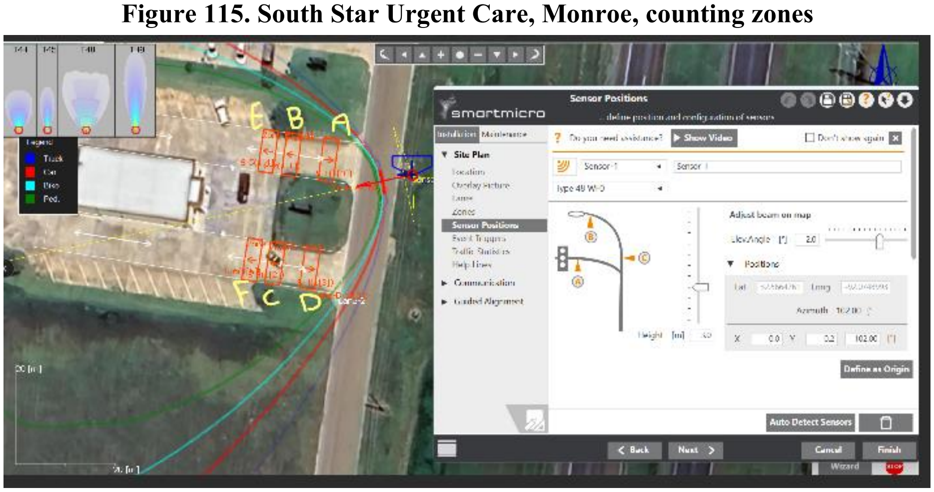


Table 80 shows the verification counts for the South Star Urgent Care radar device. Looking just at the SMATS radar counts, these should be identical for Zones C and F, and identical for Zones B and E. For Zones C and F, there are three 15-minute periods (out of 24) in which the counts differ. Two of these differ by one vehicle, and one differs by two. For Zones B and E, there are two 15-minute periods that differ by one vehicle.

Because the number of vehicles entering and exiting the facility is so small, it is not very useful to discuss errors in percentage terms. Instead, numerical differences are discussed. Looking first at vehicles entering the south driveway, Zone C undercounted by one vehicle in the first two-hour period. The counts from the two video cameras also differed by one and were both higher than the radar. In the second test period, the radar agreed with the video counts exactly. In the third period, the radar undercounted by two vehicles. For Zone F, the radar agreed with the video counts from the north camera and differed from the south camera by one vehicle in the morning test period.

Table 79. Comparison of radar and visual counts for South Star Urgent Care, Monroe

Date/ Time	Radar						Video counts							
	In (South)		In (North)		Out (South)	Out (North)	Camera 1 (North)				Camera 2 (South)			
	Zone C	Zone F	Zone B	Zone E	Zone D	Zone A	In (South)	In (North)	Out (South)	Out (North)	In (South)	In (North)	Out (South)	Out (North)
9/17/2024														
10:00 to 10:15	0	0	0	1	0	1	1	0	0	1	1	0	0	1
10:15 to 10:30	0	1	4	4	4	1	0	2	2	1	1	2	3	1
10:30 to 10:45	0	0	0	0	0	1	0	0	0	1	0	0	0	1
10:45 to 11:00	1	1	1	2	1	0	2	1	2	0	2	1	2	0
11:00 to 11:15	1	1	0	0	1	0	0	0	0	0	0	0	0	0
11:15 to 11:30	0	0	1	1	0	0	0	2	0	0	0	2	0	0
11:30 to 11:45	0	0	1	1	0	0	0	0	0	0	0	0	0	0
11:45 to 12:00	0	0	0	0	0	0	0	3	1	0	0	3	1	0
Total	2	3	7	9	6	3	3	8	5	3	4	8	6	3
Difference	-1	0	-1	+1	0	0								
9/18/2024														
12:00 to 12:15	1	1	1	1	2	0	1	1	1	0	1	1	1	0
12:15 to 12:30	0	0	0	0	1	0	0	0	1	0	0	0	1	0
12:30 to 12:45	0	0	0	0	1	0	0	0	1	0	0	0	1	0
12:45 to 13:00	1	1	1	1	2	0	1	1	2	0	1	1	2	0
13:00 to 13:15	1	1	0	0	1	0	1	0	1	0	1	0	1	0
13:15 to 13:30	0	0	1	1	0	0	0	1	0	0	0	1	0	0
13:30 to 13:45	0	0	3	2	0	0	0	2	0	0	0	2	0	0
13:45 to 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	3	6	5	7	0	3	5	6	0	3	5	6	0
Difference	0	0	+1	0	+1	0								
9/19/2024														
16:00 to 16:15	1	0	0	0	2	0					1	0	2	0
16:15 to 16:30	0	0	0	0	0	1					0	0	0	0
16:30 to 16:45	0	0	1	1	1	0					0	1	1	0
16:45 to 17:00	0	1	2	2	0	1					1	2	0	1

Date/ Time	Radar						Video counts							
	In (South)		In (North)		Out (South)	Out (North)	Camera 1 (North)				Camera 2 (South)			
	Zone C	Zone F	Zone B	Zone E	Zone D	Zone A	In (South)	In (North)	Out (South)	Out (North)	In (South)	In (North)	Out (South)	Out (North)
17:00 to 17:15	0	0	0	0	0	0					0	0	0	0
17:15 to 17:30	0	0	1	1	2	0					0	1	2	0
17:30 to 17:45	0	0	0	0	0	1					2	0	2	1
17:45 to 18:00	1	3	1	1	2	0					0	0	0	1
Total	2	4	5	5	7	3					4	4	7	3
Difference	-2	0	+1	+1	0	0								

For Zone B, the radar undercounted by one vehicle during the morning test period relative to both camera counts. The radar overcounted by one vehicle in the afternoon period and overcounted by one in the evening period. For Zone E, the radar overcounted by one vehicle in both the morning and the evening periods and agreed exactly in the afternoon.
Considering the outbound traffic, the radar for Zone D matched the south camera in the morning (the north camera counted one fewer vehicle), overcounted by one vehicle in the afternoon (the two video counts agreed), and matched exactly in the evening. For Zone A, the radar was in exact agreement with the video counts for all three periods.

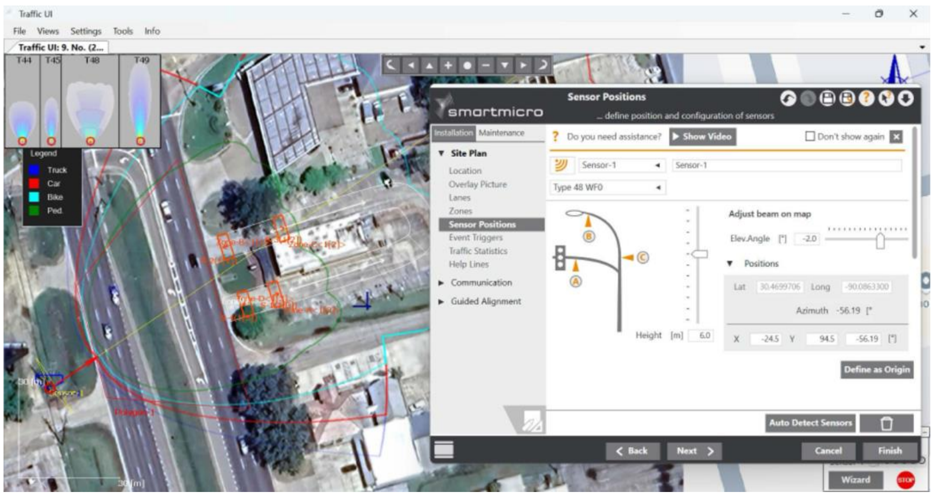
It is also notable that the 15-minute intervals in which no vehicles were detected by the radar or the video counts are generally in complete agreement. Overall, the radar detection was accurate for this facility, although Zones E and F showed slightly higher accuracy for entering vehicles than Zones B and C. Also, with such low numbers of vehicle detections, a small discrepancy in the time synchronization among the two video cameras and the radar could account for several of the differences in counts. It was noted while making the counts from the video recordings that a vehicle was often counted entering or exiting the facility within a few seconds of the beginning or ending of the 15-minute time period, and it was not possible to determine from the position of the video cameras exactly when an exiting or entering vehicle actually passed through the counting zone.

Week 6 Data Verification Checks for New Orleans Daiquiris, Covington, and Dollar General, Mandeville

New Orleans Daiquiris, Covington
Figure 115 shows the radar location and counting zones for the New Orleans Daiquiris in Covington, located on US 190. This is a very busy roadway, which created problems with phantom entries into the drive-thru's north driveway. This was partially fixed by 16:30 on

September 25, and counts from September 24 until 16:30 on September 25 in this zone are to be ignored. As shown in Figure 113, the radar was mounted at a height of six meters to avoid problems with traffic on US 190. There are four zones for counting. Zone A is entering traffic in the south driveway, Zone B is exiting traffic in the north driveway, Zone C is entering traffic in the north driveway, and Zone D is exiting traffic in the south driveway. The initial video camera location was on the same pole as the radar. However, it turned out that this location provided video that was too out of focus and too distant to be used for verification checks. An additional video camera was installed on the weekend to the north of the north driveway, providing the only usable video for verification checks. Three time periods were chosen for verification, all on September 30: 10:00 to 12:00, 13:30 to 15:30, and 17:30 to 19:30.

Figure 116. Measurement zones and radar location for New Orleans Daiquiris, Covington



The comparison of the radar counts and the counts made from the video are shown in Table 81. No vehicles were observed entering in the north driveway (Zone C), and none were seen exiting from the south driveway (Zone D). However, the radar counted phantom vehicles entering and exiting in these zones. Attempts were made to reduce these phantom vehicle counts, but these were only partially successful. Because the counts are so low, it is not useful to discuss accuracy in terms of percentage. In Zone A, which was the principal entry count, the morning period gave an overcount of two vehicles, comprising one additional vehicle from 10:00 to 10:15 a.m. and one vehicle from 11:45 a.m. to noon. Five of the 15-minute periods in the morning showed a zero count both for the radar and the video.

Table 80. Radar counts and visual counts for New Orleans Daiquiris, Covington

Date/Time	Radar				Video counts			
	In (South)	In (North)	Out (South)	Out (North)	Camera 1 (North)			
	Zone A	Zone C	Zone D	Zone B	In (South)	In (North)	Out (South)	Out (North)
9/30/2024								
10:00 to 10:15	2	0	1	0	1	0	0	0
10:15 to 10:30	0	0	0	1	0	0	0	1
10:30 to 10:45	0	2	0	0	0	0	0	0
10:45 to 11:00	0	0	0	0	0	0	0	0
11:00 to 11:15	2	1	0	0	2	0	0	0
11:15 to 11:30	0	0	0	0	0	0	0	0
11:30 to 11:45	0	0	0	0	0	0	0	0
11:45 to 12:00	1	2	0	0	0	0	0	1
Total	5	5	1	1	3	0	0	2
Difference	2	5	1	-1				
9/30/2024								
13:30 to 13:45	0	3	1	4	0	0	0	1
13:45 to 14:00	1	3	1	0	0	0	0	0
14:00 to 14:15	0	2	0	1	1	0	0	1
14:15 to 14:30	0	2	0	0	0	0	0	0
14:30 to 14:45	3	2	1	0	3	0	0	3
14:45 to 15:00	0	0	0	0	0	0	0	0
15:00 to 15:15	2	1	0	1	1	0	0	1
15:15 to 15:30	1	1	0	0	2	0	0	1
Total	7	14	2	6	7	0	0	7
Difference	0	14	2	-1				
9/30/2024								
17:30 to 17:45	1	0	0	0	2	0	0	1
17:45 to 18:00	0	1	0	1	0	0	0	1
18:00 to 18:15	0	1	0	0	0	0	0	1
18:15 to 18:30	2	0	0	0	1	0	0	2
18:30 to 18:45	5	0	0	4	5	0	0	5
18:45 to 19:00	1	2	0	0	1	0	0	1
19:00 to 19:15	1	2	0	1	1	0	0	1
19:15 to 19:30	2	1	0	0	2	0	0	2
Total	12	7	0	6	12	0	0	14
Difference	0	7	0	-8				

For Zone A in the afternoon, the total number of vehicles matches exactly between the radar and video counts, but within the 15-minute period, there are two discrepancies. These could be caused by slight differences between the times shown in the video and those used by the radar. In the evening, the total counts for Zone A again match exactly, with two 15-minute periods differing by one vehicle, which could again be due to slight timing discrepancies.

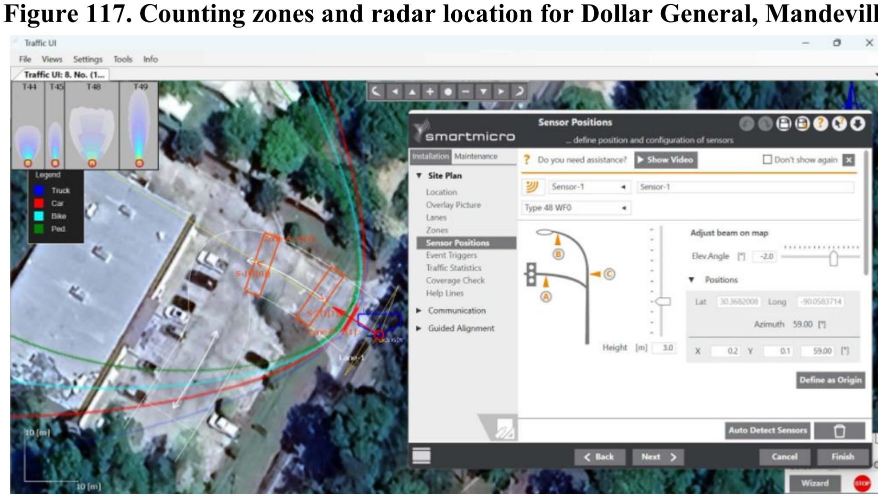
For Zone B, which is vehicles exiting from the north driveway, the morning counts disagree by one vehicle, which again could be a result of a lack of synchronization between the video counts and the radar. In the afternoon, the total counts match exactly, but there are two disagreements by one vehicle each in the 15-minute periods. This is not a serious issue. However, the evening period shows a very substantial undercount of eight vehicles. The video has been triple checked, and the same counts were obtained each time. It is unclear why the radar lost so many vehicles.

Overall, for this location, Zone A for entering vehicles provided a reasonably accurate count. Zone B for exiting vehicles showed acceptable accuracy for the morning and afternoon periods, but the evening shows a serious undercount that cannot be readily explained. The other two zones, which could have been omitted, showed problematic phantom counts, although it should be noted that Zone D had only a few phantom counts, while Zone C had many more. This was also the zone where the largest problem of phantom vehicle entries was found at the beginning of the monitoring period. In hindsight, the counts from Zones C and D should be ignored completely. Because the roadway is a divided highway with a high volume of traffic, it appears that vehicles entered only from the south driveway and exited only from the north driveway.

Dollar General, Mandeville

Figure 116 shows the location of the counting zones and the radar for the Dollar General in Mandeville. The video camera was located to the north of the driveway and was only in operation for the final one-and-a-half days of site monitoring. Because the road on which this site is located is only a three-lane roadway, the radar was mounted at three meters above ground. Three time periods were again chosen for this site: 13:30 to 15:30 on September 30, 17:00 to 19:00 on September 30, and 9:00 to 11:00 on October 1.

Figure 117. Counting zones and radar location for Dollar General, Mandeville



For this location, only two counting zones were defined: Zone A for entering traffic and Zone B for exiting traffic. Also, because the available utility pole for the radar was almost directly opposite the driveway, the entering and exiting traffic were ideally captured by the radar. The results of the video counts are shown in Table 82.

For Zone A, the radar overcounted entering traffic in all three periods, though by only 6 to 13%. With only one or two exceptions, the counts only differ by one or two vehicles in most 15-minute periods.

However, the results for Zone B, the exiting traffic, are much poorer. The counts are serious undercounts from the radar in all cases, with the afternoon being the most accurate, at 17%, while the worst is the morning period, at 37%. Looking at the configuration in Figure 116, it appears likely that the counting zone was too close to the radar. In most 15-minute periods, the undercounts were of similar proportion, although there is also an occasional overcount.

Table 81. Verification results for Dollar General, Mandeville

Date/Time	Radar		Video Counts	
	In	Out		
	Zone A	Zone B	In	Out
10/1/2024				
10:00 to 10:15	4	7	3	14
10:15 to 10:30	14	7	15	7
10:30 to 10:45	12	8	10	11
10:45 to 11:00	7	2	6	9
11:00 to 11:15	4	3	6	2
11:15 to 11:30	14	4	8	11
11:30 to 11:45	11	8	11	13
11:45 to 12:00	6	6	8	5
Total	72	45	67	72
Percentage	107.5%	62.5%		
9/30/2024				
13:30 to 13:45	8	8	8	7
13:45 to 14:00	13	2	10	9
14:00 to 14:15	6	6	5	6
14:15 to 14:30	10	7	10	11
14:30 to 14:45	8	9	9	8
14:45 to 15:00	12	8	11	12
15:00 to 15:15	12	9	10	10
15:15 to 15:30	18	14	14	13
Total	87	63	77	76
Percentage	113.0%	82.9%		
9/30/2024				
17:00 to 17:15	18	12	12	19
17:15 to 17:30	17	14	16	18
17:30 to 17:45	21	15	20	21
17:45 to 18:00	16	7	15	11
18:00 to 18:15	12	7	16	15
18:15 to 18:30	21	8	13	12
18:30 to 18:45	16	13	17	25
18:45 to 19:00	22	19	25	16
Total	143	95	134	137
Percentage	106.7%	69.3%		

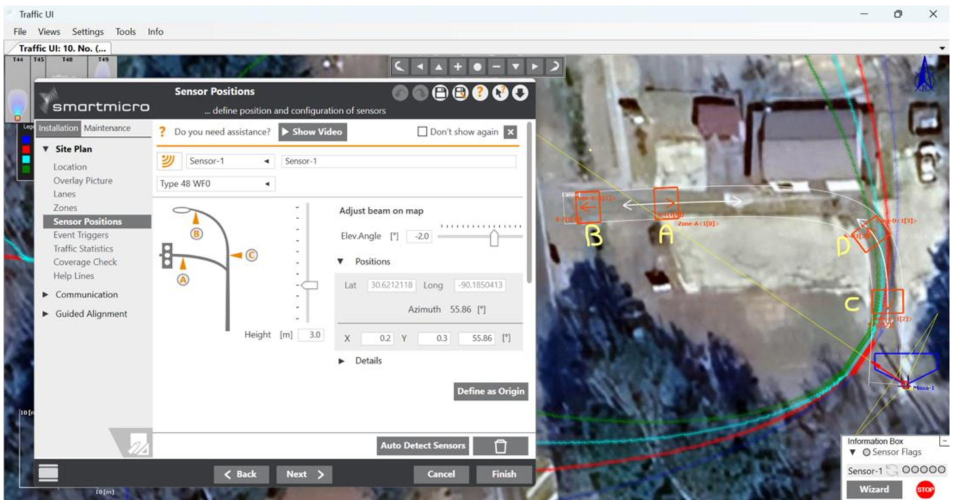
Overall, the accuracy of the entry counts is acceptable, while that of the exit counts is not. It is recommended that, in a similar situation, two exit count zones be used: one close to the street, as in this case, and one farther away, near the entry count zone.

Week 7 Data Verification Checks for Wacky Daiquiri and Tsunami Carwash

Wacky Daiquiri, Folsom

At the Wacky Daiquiri site, there are two driveways. Figure 117 illustrates the position of the radar, installed at a height of three meters. This radar was used to count the number of vehicles entering through Zone A and Zone D, and exiting through Zone B and Zone C, as shown in Figure 117.

Figure 118. Counting zones and radar position at Wacky Daiquiri, Folsom



Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. The accuracy for the entering vehicles in Zone A is 104%, while the accuracy for illegal exiting counts is nearly 100%. Table 83 provides more detailed information on the entering counts for each timestamp. For the exiting counts, only three vehicles were recorded over the six-hour verification period.

However, for Zones C and D (covering exiting vehicles and illegal entrances, respectively), the radar failed to generate accurate counts. The radar cannot properly detect vehicles in these zones because its coverage area is too limited, and it is not a side-facing radar. After reviewing six hours of video recordings at the driveway where Zone C is located, it was found that no vehicles entered illegally through this driveway, except for two vehicles that entered to maneuver back onto the main road, rather than using the drive-thru. Therefore, since all entering vehicles used the driveway at Zone A, the Zone A counts can be relied on as the total number of visits.

To summarize, the overall accuracy for the entering zones is acceptable, and the number of visits for Zone A should be addressed.

Table 82. Visual counts and radar counts for Wacky Daiquiri, Folsom, Zone A

Date/Time	Radar In Zone A	Video Counts In
10/2/2024		
17:00 to 17:15	0	0
17:15 to 17:30	1	1
17:30 to 17:45	1	3
17:45 to 18:00	3	1
18:00 to 18:15	0	0
18:15 to 18:30	0	0
18:30 to 18:45	1	1
18:45 to 19:00	0	0
Total	6	6
Percentage	100%	
9/30/2024		
11:30 to 11:45	1	1
11:45 to 12:00	1	1
12:00 to 12:15	0	0
12:15 to 12:30	0	0
12:30 to 12:45	1	0
12:45 to 13:00	1	2
13:00 to 13:15	0	0
13:15 to 13:30	0	0
Total	4	4
Percentage	100%	
9/30/2024		
14:00 to 14:15	2	1
14:15 to 14:30	1	1
14:30 to 14:45	3	3
14:45 to 15:00	1	1
15:00 to 15:15	0	0
15:15 to 15:30	1	1
15:30 to 15:45	1	1
15:45 to 16:00	0	0
Total	9	8
Percentage	112.5%	

Tsunami Car Wash, Geismar

Figure 118 shows the position of the radar, installed at a height of three meters. This radar was primarily used to count the number of entering vehicles from Zone A and exiting vehicles from Zone B. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. The overall accuracy for the entering counts is 118%, while the accuracy for the exiting counts is approximately 97%. Table 84 provides further details by time.

In summary, the overall accuracy for the exiting zone is acceptable, and the number of visits should be assessed based on the counts from Zone B.

Figure 119. Counting zones and radar location at Tsunami Carwash, Geismar

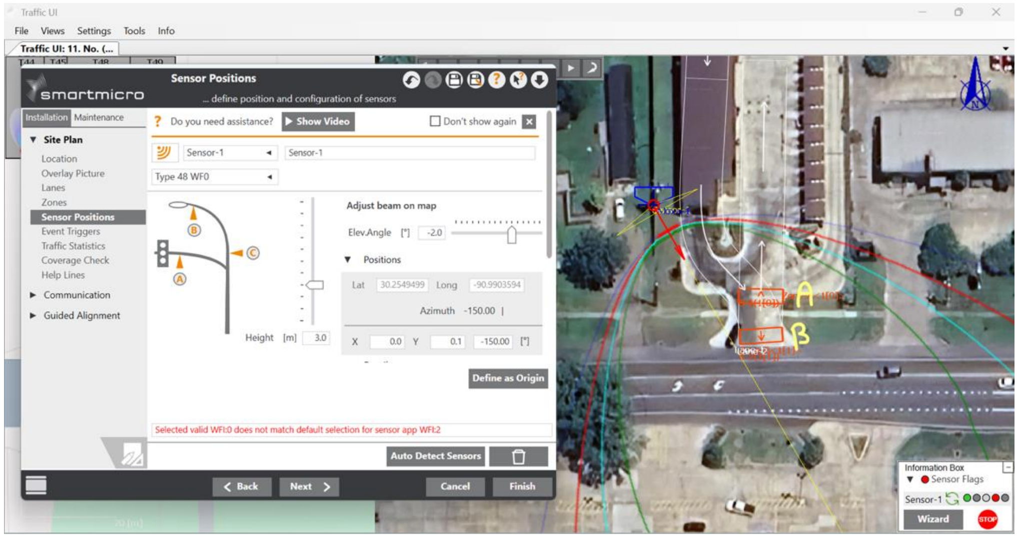


Table 83. Visual counts and SMATS radar counts for Tsunami Carwash, Geismar, Zones A and B

Date/Time	Radar		Video Counts	
	In	Out		
	Zone A	Zone B	In	Out
10/2/2024				
17:00 to 17:15	5	8	3	8
17:15 to 17:30	2	3	6	3
17:30 to 17:45	4	2	4	4
17:45 to 18:00	1	3	1	2
18:00 to 18:15	4	2	4	2
18:15 to 18:30	2	4	2	4
18:30 to 18:45	4	4	2	4
18:45 to 19:00	3	2	3	5
Total	25	28	25	32
Percentage	100%	88%		
10/3/2024				
10:00 to 10:15	16	9	8	11
10:15 to 10:30	13	8	5	3
10:30 to 10:45	12	9	9	10
10:45 to 11:00	9	15	14	12
11:00 to 11:15	18	8	11	7
11:15 to 11:30	10	6	12	10
11:30 to 11:45	15	15	15	17
11:45 to 12:00	12	9	10	3
Total	105	79	84	83
Percentage	125%	95%		
10/3/2024				
14:00 to 14:15	4	12	3	7
14:15 to 14:30	5	3	5	7
14:30 to 14:45	5	6	3	3
14:45 to 15:00	5	3	1	3
15:00 to 15:15	4	2	3	4
15:15 to 15:30	5	2	4	2
15:30 to 15:45	4	10	6	7
15:45 to 16:00	2	3	1	5
Total	34	41	26	38
Percentage	131%	108%		

Week 8 Data Verification Checks for Regions Bank, Gonzales

Regions Bank, Gonzales, North Airline Hwy Entrance/Exit

Figure 119 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. An automated counting tool using YOLO was developed for vehicle counts. Table 85 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 112%, and for exiting counts, it is 105%.

Figure 120. Camera view at North Airline Hwy entrance/exit (S1)

Table 84. Comparison of automated counts and visual counts for Regions Bank, Gonzales, North Airline Hwy entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:30-10:30	29	6	30	7	103	117
05/13/2025	12:00-14:00	32	5	35	5	109	100
05/13/2025	15:30-17:30	22	8	28	8	127	100
Total		83	19	93	20	112	105

Regions Bank, Gonzales, East Weber City St Entrance/Exit

Figure 120 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table

86 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 95%, and for exiting counts, it is 111%.

Figure 121. Camera view at East Weber City St entrance/exit (S2)

Table 85. Comparison of automated counts and visual counts for Regions Bank, Gonzales, East Weber City St entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:30-10:30	51	64	47	67	92	105
05/13/2025	12:00-14:00	48	75	42	85	88	113
05/13/2025	15:30-17:30	32	61	36	69	113	113
Total		131	200	125	221	95	111

Table 87 provides further details on the visual and automated counts for each period for the total of both sides (S1 and S2). The overall accuracy for entering counts in total is 102%, and for exiting counts, it is 110%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 86. Comparison of automated counts and visual counts for Regions Bank, Gonzales

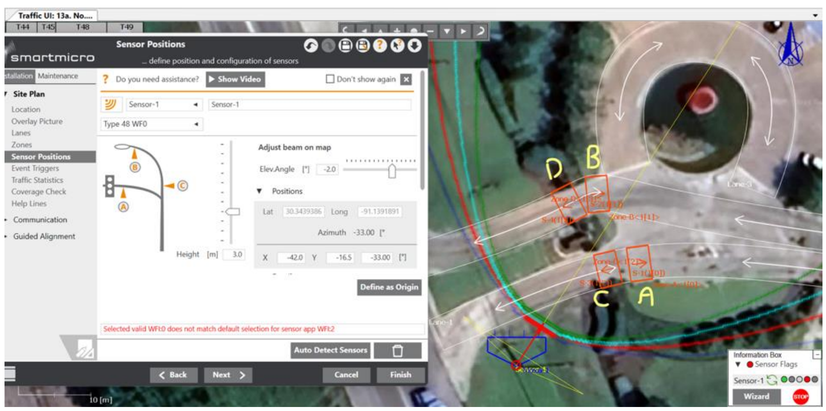
Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:30-10:30	80	70	77	74	96	106
05/13/2025	12:00-14:00	80	80	77	90	96	113
05/13/2025	15:30-17:30	54	69	64	77	119	112
Total		214	219	218	241	102	110

Week 9 Data Verification Checks for Indigo Park Apartment Complex

Indigo Park Apartment Complex, Baton Rouge, Nicholson Dr Entrance/Exit

Figure 121 shows the location of the radar and the counting zones for the entrance and exit for the Nicholson Drive entrance/exit to the Indigo Park Apartments in Baton Rouge. Because the utility pole is on the same side of the road as the apartment driveway, the radar was mounted at three meters. As can be seen, the radar had to be mounted at a very oblique angle, which almost certainly resulted in problems with the radar counts. During the observation periods from the video camera, only two vehicles were seen entering the left lane, and none were seen exiting the right lane. Three time periods were chosen for verification: October 18 from 18:00 to 20:00, and October 21 from 07:00 to 09:00 and from 12:30 to 14:30.

Figure 122. Counting zones and radar location for Indigo Park Apartment Complex, Baton Rouge, Nicholson Dr entrance/exit



The comparison of the radar counts and the video counts are shown in Table 88. Only two vehicles were observed entering the north driveway (Zone B), and none were seen exiting from the south driveway (Zone C). However, the radar counted phantom vehicles entering and exiting in these zones. The radar undercounted in both Zones A (entering vehicles) and Zone D (exiting vehicles). These undercounts were very high, with Zone A undercounts of 30, 27, and 37% in the three periods, respectively. The Zone D undercounts were 26, 20, and 17%, respectively. Thus, Zone D counts were less undercounted than Zone A, probably because the angle for Zone D was slightly better than that for Zone A. This oblique angle should be avoided as much as possible in future setups. However, the locations where the radar can be mounted often leave few options for improvement.

Table 87. Radar counts and visual counts for Indigo Park Apartment Complex, Baton Rouge, Nicholson Dr entrance/exit

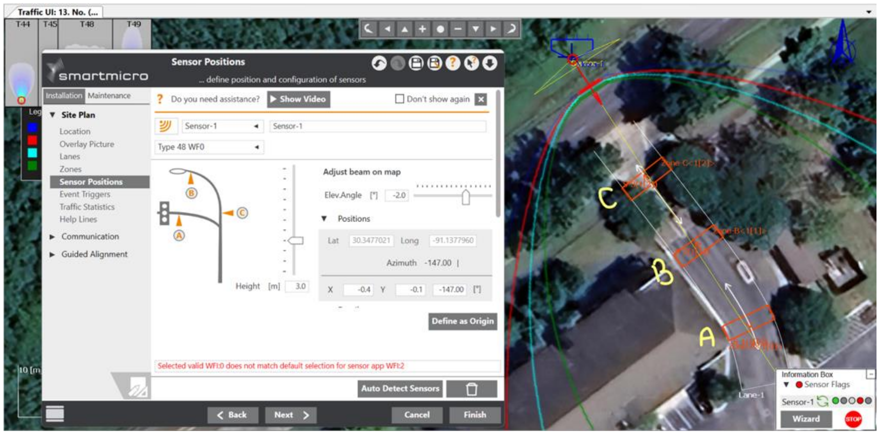
Date/Time	Radar				Video counts			
	In (South)	In (North)	Out (South)	Out (North)	Camera			
	Zone A	Zone B	Zone C	Zone D	In (South)	In (North)	Out (South)	Out (North)
10/18/2024								
18:00 to 18:15	4	0	2	4	10	0	0	6
18:15 to 18:30	15	1	4	5	18	0	0	12
18:30 to 18:45	2	1	1	6	5	0	0	5
18:45 to 19:00	5	1	0	1	7	0	0	3
19:00 to 19:15	4	1	1	3	7	0	0	4
19:15 to 19:30	2	0	0	2	7	0	0	4
19:30 to 19:45	9	7	2	4	11	1	0	5
19:45 to 20:00	12	0	4	6	10	0	0	3
Total	53	11	14	31	75	1	0	42
Difference	-22	+10	+14	-11				
10/21/2024								
7:00 to 7:15	1	0	0	2	2	0	0	4
7:15 to 7:30	2	0	0	5	3	0	0	6
7:30 to 7:45	4	1	0	5	3	0	0	11
7:45 to 8:00	2	0	0	4	1	0	0	3
8:00 to 8:15	2	1	1	6	4	0	0	7
8:15 to 8:30	2	0	1	4	3	0	0	5
8:30 to 8:45	1	0	0	2	1	1	0	2
8:45 to 9:00	5	2	1	4	9	0	0	2
Total	19	4	3	32	26	1	0	40
Difference	-7	+3	+3	-8				
10/21/2024								
12:30 to 12:45	7	3	2	9	9	0	0	5
12:45 to 13:00	2	1	0	4	3	0	0	5
13:00 to 13:15	3	1	1	3	5	0	0	3
13:15 to 13:30	4	3	2	4	7	0	0	6
13:30 to 13:45	5	0	0	5	5	0	0	5
13:45 to 14:00	2	1	1	0	8	0	0	1
14:00 to 14:15	2	0	1	1	2	0	0	3
14:15 to 14:30	2	0	0	3	4	0	0	7
Total	27	9	7	29	43	0	0	35
Difference	-16	+9	+7	-6				

Overall, these results are not acceptably accurate. If time permits, this site should be considered for remeasuring using the trailer mount in place of the utility pole used for this location.

Indigo Park Apartment Complex, Baton Rouge, Gardere Ln Entrance/Exit

Figure 122 shows the location of the counting zones and the radar for the Gardere Lane entrance/exit to the Indigo Park Apartments. The video camera was located opposite the driveway, as shown in Figure 122. Because the road on which this site is located is only a two-lane roadway, the radar was mounted at three meters above ground. The monitoring of Indigo Park commenced on Friday afternoon and was paused over the weekend before resuming on Monday, October 21. However, the video camera at this location ran out of power on Sunday, so only Monday afternoon and evening were available for verification checks. Therefore, verification was conducted from October 18 at 16:00 to 20:00, for a total of four hours.

Figure 123. Counting zones and radar location for Indigo Park Apartment Complex, Baton Rouge, Gardere Ln entrance/exit



For this location, three counting zones were defined: Zone A for entering traffic, and Zones B and C for exiting traffic. Unfortunately, Zone A is located too far back, as vehicles were observed entering the building shown on the far right of Figure 122 from within the apartment complex and then returning to the apartments. This will likely result in a significant overcount of entries to the apartment complex. Also, Zone B is expected to show an overcount. The results of the video counts are shown in Table 89.

Table 88. Verification results for Gardere Ln entrance/exit

Date/Time	Radar			Video Counts	
	In	Out			
	Zone A	Zone B	Zone C	In	Out
10/18/2024					
16:00 to 16:15	2	4	2	3	4
16:15 to 16:30	9	11	9	14	10
16:30 to 16:45	12	15	9	7	16
16:45 to 17:00	8	10	10	9	4
17:00 to 17:15	9	12	9	6	10
17:15 to 17:30	12	15	11	12	10
17:30 to 17:45	13	9	5	6	5
17:45 to 18:00	6	9	9	9	9
18:00 to 18:15	10	14	11	7	10
18:15 to 18:30	12	20	13	16	12
18:30 to 18:45	10	15	16	4	11
18:45 to 19:00	5	9	10	4	11
19:00 to 19:15	6	11	9	7	7
19:15 to 19:30	13	7	9	7	6
19:30 to 19:45	7	9	9	7	9
19:45 to 20:00	6	12	13	5	10
Total	140	182	154	123	144
Percentage	113.8%	126.4%	106.9%		

For Zone A, the radar overcounted entering traffic as expected, by only 13.8%. In most 15-minute periods, the overcounts are by no more than two or three vehicles, which is about the number seen turning around within the apartment complex. For existing traffic, as expected, Zone B shows a much higher count than Zone C due to the turnaround traffic. Zone C, which should be regarded as the correct exit count, overcounted by just under 7%. Overall, the accuracy of the Zone C exit counts is acceptable, while that of the entry counts is not. The entrance zone should have been set just inside the automatic gates to the north of Zone B. If this location is remeasured, this change in counting location should be implemented.

Week 9 Data Verification Checks for Indigo Park Apartment Complex (Remeasured)

Indigo Park Apartment Complex, Baton Rouge, Nicholson Dr Entrance/Exit

This site has two entrances/exits, but at the time of recording, the gate on Gardere Lane was closed. Therefore, the counts were only taken from the gate on Nicholson Drive. Figure 123 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 90 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 104%, and for exiting counts, it is 102%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 124. Camera view at Nicholson Dr entrance/exit

Table 89. Comparison of automated counts and visual counts for Indigo Park Apartment Complex, Baton Rouge, Nicholson Dr entrance/exit

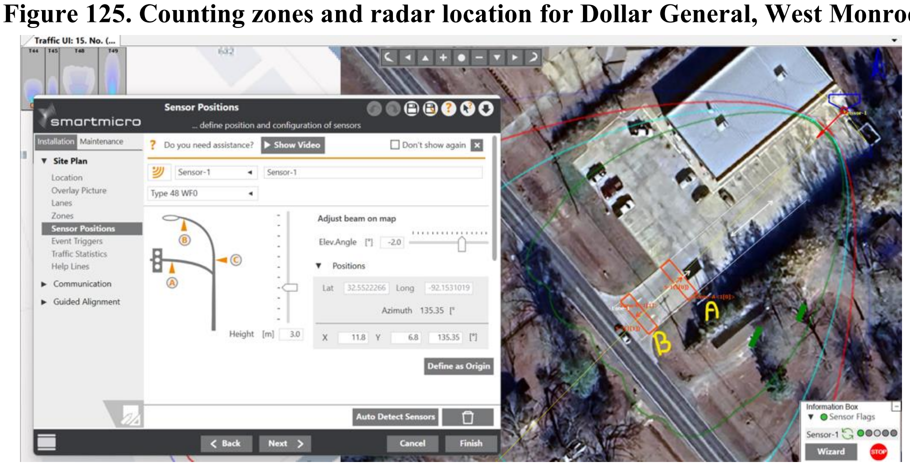
Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/06/2025	6:30-8:30	26	142	27	142	104	100
05/06/2025	12:00-14:00	86	75	87	76	101	101
05/06/2025	17:00-19:00	141	82	149	86	106	105
Total		253	299	263	304	104	102

Week 10 Data Verification Checks for Dollar General, West Monroe, and Dollar General, Sterlington

Dollar General, West Monroe

Figure 124 shows the location of the radar and the counting zones for the entrance and exit for the Dollar General on Whites Ferry Rd in West Monroe. As can be seen, the radar was mounted at the back of the parking lot, facing towards the entrance driveway, at a height of three meters. The video camera was mounted on the utility pole to the northeast of the driveway. Three time periods were chosen for verification: October 29 from 08:00 to 10:00 and from 16:00 to 18:00, and October 30 from 11:30 to 13:30.

Figure 125. Counting zones and radar location for Dollar General, West Monroe



The comparison of the radar and video counts is shown in Table 91. The errors in the counts are very high in this case. Several of the video counts were rechecked and found to be correct. However, the radar overcounted in all test periods. The best correspondence was in the first counting period for vehicles exiting, where the error is an overcount of 10.3%. The inward count in that period is an overcount of 22.6%, which is not acceptable. It was noted that a vehicle with a trailer was parked on the side of the exit driveway, probably overlapping into Zone A. This was parked for some time. There was also a semi-trailer parked for the delivery of goods, approximately where the double-ended white arrow is shown above Zone A. It is unclear what effect this might have had on the counts.

Table 90. Radar counts and visual counts for Dollar General, West Monroe

Date/Time	Radar counts		Video counts	
	In Zone A	Out Zone B	In	Out
10/29/2024				
8:00 to 8:15	4	0	4	1
8:15 to 8:30	19	6	9	6
8:30 to 8:45	4	5	5	5
8:45 to 9:00	1	0	3	5
9:00 to 9:15	4	8	3	4
9:15 to 9:30	1	5	1	3
9:30 to 9:45	1	5	1	2
9:45 to 10:00	4	3	5	2
Total	38	32	31	29
Difference	+7	+3		
10/29/2024				
16:00 to 16:15	11	5	5	6
16:15 to 16:30	12	15	8	9
16:30 to 16:45	13	16	9	9
16:45 to 17:00	10	12	4	5
17:00 to 17:15	9	21	9	9
17:15 to 17:30	11	11	10	9
17:30 to 17:45	9	11	8	8
17:45 to 18:00	5	12	9	8
Total	80	103	62	63
Difference	+18	+40		
10/30/2024				
11:30 to 11:45	2	0	1	0
11:45 to 12:00	6	5	8	6
12:00 to 12:15	12	12	7	6
12:15 to 12:30	9	8	5	5
12:30 to 12:45	5	6	9	5
12:45 to 13:00	16	12	6	9
13:00 to 13:15	9	15	5	8
13:15 to 13:30	6	18	2	4
Total	65	76	43	43
Difference	+22	+33		

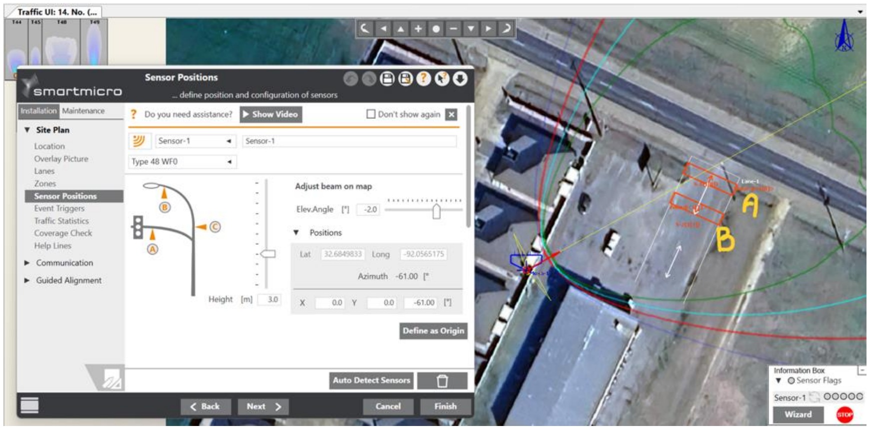
For the other two periods, the overcounts are large and unacceptable. For the evening period, the errors are 29% for incoming traffic and 63% for outward traffic, and for the afternoon period on October 30, the errors are 51 and 77% for inbound and outbound traffic, respectively. There are no parked delivery vehicles or vehicles with trailers in the last of these periods. There is no clear reason for these massive overcounts.

Overall, these results are not acceptably accurate. If time permits, this site should be considered for remeasuring using the trailer mount on the opposite side of the road from the driveway.

Dollar General, Sterlington

Figure 125 shows the location of the counting zones and the radar for the Dollar General on LA 2 in Sterlington. As can be seen, the utility pole is not in an ideal location and requires an oblique angle to the entering and exiting traffic. The radar was mounted at three meters. There were occasions when a semi-trailer was parked in the forecourt or along the driveway, which could affect the radar counts.

Figure 126. Counting zones and radar location for Dollar General, Sterlington



For this location, two counting zones were defined: Zone A for exiting traffic, and Zone B for entering traffic. The video camera was mounted on the utility pole at the top corner of the forecourt. The times chosen for verification were October 29 from 11:30 to 13:30 and 16:00 to 18:00, and October 30 from 9:00 to 11:00. The results of the video counts are shown in Table 92.

Table 91. Verification results for Dollar General, Sterlington

Date/Time	Radar		Video Counts	
	In	Out		
	Zone B	Zone A	In	Out
10/29/2024				
11:30 to 11:45	6	4	7	11
11:45 to 12:00	7	8	8	3
12:00 to 12:15	12	10	10	8
12:15 to 12:30	4	2	4	8
12:30 to 12:45	11	4	11	5
12:45 to 13:00	8	8	7	13
13:00 to 13:15	4	9	4	4
13:15 to 13:30	9	4	5	5
Total	61	49	56	57
Difference	+5	-8		
10/29/2024				
16:00 to 16:15	5	10	3	3
16:15 to 16:30	7	8	8	6
16:30 to 16:45	17	9	10	4
16:45 to 17:00	10	8	9	13
17:00 to 17:15	11	9	11	12
17:15 to 17:30	11	9	10	12
17:30 to 17:45	6	14	5	7
17:45 to 18:00	6	13	5	3

Date/Time	Radar		Video Counts	
	In	Out		
	Zone B	Zone A	In	Out
Total	73	80	61	60
Difference	+12	+20		
10/30/2024				
09:00 to 09:15	2	6	3	3
09:15 to 09:30	3	2	2	2
09:30 to 09:45	4	9	2	3
09:45 to 10:00	6	5	5	2
10:00 to 10:15	6	3	6	6
10:15 to 10:30	7	5	5	3
10:30 to 10:45	6	5	5	7
10:45 to 11:00	7	11	5	3
Total	41	46	33	29
Difference	+8	+17		

In Zone A during the first verification period, the radar undercounted exiting traffic by 14%. In most 15-minute periods, the undercounts are usually by no more than two or three vehicles, although there are four time periods where the difference is much larger. For Zone B in the same period, the accuracy is much better, with an overcount of 8.9%. However, the differences in individual 15-minute periods are much less variable. In the evening period, the results are much worse, with overcounts of 33.3 and 19.7% for Zones A and B, respectively. In the afternoon verification period on the next day, the overcounts are even worse, with errors of 58.6 and 24.2%, respectively, for Zones A and B. There is again no obvious reason for these substantial overcounts, as there is no nearby intersection or other issue with turning vehicles that could confuse the radar.

Overall, the accuracy of the Zone B entry counts is acceptable in the first and third time periods, while that of the exit counts is not. Again, if time permits, this location could be recounted with the trailer opposite the driveway and mounted at six meters.

Another notable observation is that the visual counts are generally balanced, with almost equal numbers of exits and entries in each time period used for verification at both locations. This is expected, because most people do not spend more than 15 to 30 minutes shopping in these stores. Hence, in a two-hour period, the entries and exits should be balanced. The radar counts are generally significantly out of balance. This suggests that the radar counts are having more problems in one direction than the other.

Week 10 Data Verification Checks for Dollar General, Sterlington, and Dollar General, West Monroe (Remeasured)

Dollar General, Sterlington, LA 2 Entrance/Exit

Figure 126 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts in this remeasurement. Table 93 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 92%, and for exiting counts, it is 92%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 127. Camera view at Dollar General, Sterlington, LA 2 entrance/exit

Table 92. Comparison of automated counts and visual counts for Dollar General, Sterlington, LA 2 entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
10.29.2024	7:30-9:30	30	30	27	25	90	83
10.29.2024	11:30-13:30	45	41	42	40	93	98
10.29.2024	18:30-20:30	47	48	43	44	91	92
Total		122	119	112	109	92	92

Dollar General, West Monroe, Whites Ferry Rd Entrance/Exit

Figure 127 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for remeasuring the vehicle counts. Table 94 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 92%, and for exiting counts, it is 92%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 128. Camera view at Dollar General, West Monroe, Whites Ferry Rd entrance/exit

Table 93. Comparison of automated counts and visual counts for Dollar General, West Monroe, Whites Ferry Rd entrance/exit

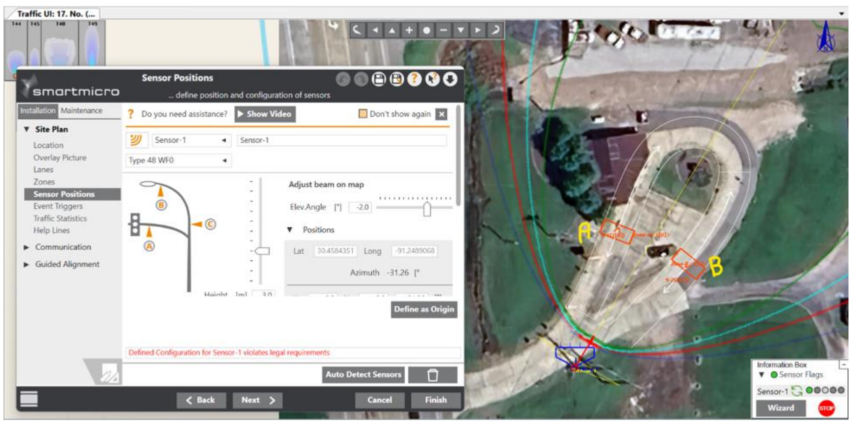
Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
10.29.2024	7:30-9:30	25	16	23	14	92	88
10.29.2024	11:30-13:30	70	75	65	70	93	93
10.29.2024	18:30-20:30	37	38	34	35	92	92
Total		132	129	122	119	92	92

Week 11 Data Verification Checks for Swamp Shack Daiquiri

Swamp Shack Daiquiri, Port Allen

Figure 128 shows the entrance and exit configuration of the Swamp Shack Daiquiri in Port Allen. At this location, a single smart radar was installed at a height of three meters. This radar was used to count vehicles entering Zone A and exiting Zone B. Additionally, video recordings were captured over five days, from November 6 to November 10, 2024, using the CountCAM4 camera in recording mode.

Figure 129. Counting zones and radar location for Swamp Shack Daiquiri, Port Allen



The verification process involves selecting two-hour intervals during the morning, afternoon, and evening periods. According to the site details document, measurements were conducted from 1:00 p.m. to 9:00 p.m. Four hours were selected for verification checks, covering both afternoon and evening periods. The overall accuracy of vehicle counts for Zone A (entry) and Zone B (exit) were 115% and 98%, respectively. Table 95 presents detailed information on vehicle entry and exit counts for each 15-minute period.

Table 94. Verification results for Swamp Shack Daiquiri, Port Allen

Location height 3 m		SMATS radar counts		Visual counts	
		Zone A (In)	**Zone B (Out)**	**In**	**Out**
11/7/2024	14:00 to 14:15	1	1	1	1
	14:15 to 14:30	0	1	0	1
	14:30 to 14:45	2	2	6	2
	14:45 to 15:00	0	0	0	0
	15:00 to 15:15	9	6	1	5
	15:15 to 15:30	1	2	2	4
	15:30 to 15:45	1	0	3	0
	15:45 to 16:00	4	4	3	3
	Total	18	16	16	16
	Accuracy %	112.5%	100%		
8/29/2024	17:00 to 17:15	4	5	5	5
	17:15 to 17:30	5	5	3	4

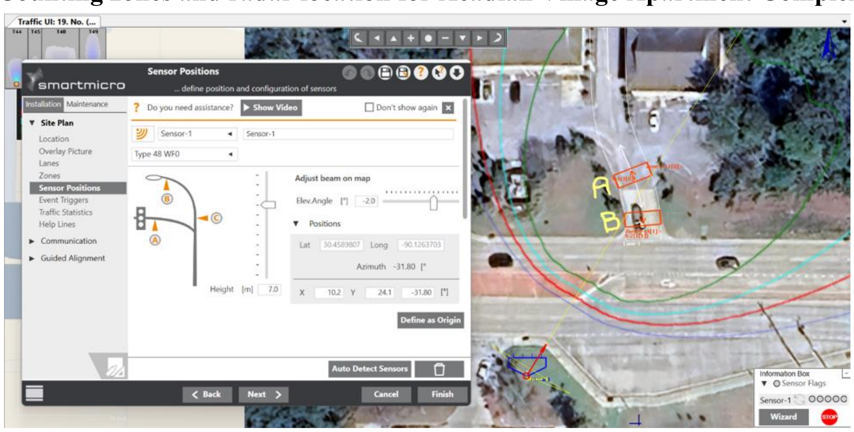
Location height 3 m		SMATS radar counts		Visual counts	
		Zone A (In)	Zone B (Out)	In	Out
	17:30 to 17:45	3	3	4	4
	17:45 to 18:00	3	3	3	3
	18:00 to 18:15	4	3	2	3
	18:15 to 18:30	4	2	5	3
	18:30 to 18:45	5	5	3	5
	18:45 to 19:00	4	3	2	3
	Total	32	29	29	30
	Accuracy %	118.5%	96.7%		

Week 12 Data Verification Checks for Acadian Village Apartment Complex

Acadian Village Apartments Complex, Covington

Figure 129 shows the entrance and exit configuration of the Acadian Village Apartment Complex in Covington. At this location, a single smart radar was installed at a height of seven meters using the LTRC trailer. On this day, for unknown reasons, the radar camera failed to operate, so the compass was used to set the radar orientation. This radar was used to count vehicles entering Zone A and exiting Zone B. Additionally, video recordings were captured over three days, from November 18 to November 20, 2024, using the CountCAM4 camera in recording mode.

Figure 130. Counting zones and radar location for Acadian Village Apartment Complex, Covington



The verification process involves selecting two-hour intervals during the morning, afternoon, and evening periods. According to the site details document, measurements were conducted from 6:00 a.m. to 9:00 p.m. Six hours were selected for verification checks, covering morning, afternoon, and evening periods. The overall accuracy of vehicle counts for Zone A (entry) and Zone B (exit) were 92% and 47%, respectively. Table 96 presents detailed information on vehicle entry and exit counts for each 15-minute period.

Table 95. Verification results for the Acadian Village Apartment Complex, Covington

Date/Time	Radar		Video counts	
	In	Out		
	Zone A	Zone B	In	Out
11/19/2024				
09:00 to 09:15	0	1	2	2
09:15 to 09:30	1	0	1	1
09:30 to 09:45	2	0	0	2
09:45 to 10:00	2	1	3	3
10:00 to 10:15	2	1	0	3
10:15 to 10:30	0	0	2	2
10:30 to 10:45	1	0	1	1
10:45 to 11:00	1	2	0	2
Total	9	5	9	16
Percentage	100%	31.3%		
11/19/2024				
14:00 to 14:15	0	0	1	1
14:15 to 14:30	1	2	1	3
14:30 to 14:45	0	0	0	0
14:45 to 15:00	1	1	1	1
15:00 to 15:15	0	2	0	4
15:15 to 15:30	1	0	1	0
15:30 to 15:45	1	1	1	1
15:45 to 16:00	0	2	0	2
Total	4	8	5	12
Percentage	80%	66.7%		
9/30/2024				
17:00 to 17:15	1	1	1	1
17:15 to 17:30	3	0	2	2
17:30 to 17:45	0	1	1	1
17:45 to 18:00	2	0	3	0
18:00 to 18:15	3	0	2	0
18:15 to 18:30	0	0	1	2
18:30 to 18:45	0	0	0	0
18:45 to 19:00	1	1	1	0
Total	10	3	11	6
Percentage	91%	50%		

While using the compass to set orientation shows promise, it should be verified at other sites. The count from the entering zone is acceptable at 92%, while the count from the exiting zone is not at 47%.

Week 13 Data Verification Checks for Louisiana National Bank

Louisiana National Bank, Ruston, North Trenton St Entrance/Exit (S1)

Figure 130 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 97 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 103%, and for exiting counts, it is 107%.

Figure 131. Camera view at North Trenton St entrance/exit (S1)

Table 96. Comparison of automated counts and visual counts for Louisiana National Bank, Ruston, North Trenton St entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05.07.2025	8:00-10:00	7	21	7	23	100	110
05.07.2025	12:00-14:00	15	54	16	57	107	106
05.07.2025	15:00-17:00	9	34	9	37	100	109
Total		31	109	32	117	103	107

Louisiana National Bank, Ruston, North Trenton St Entrance/Exit (S2)

Figure 131 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 98 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 118%, and for exiting counts, it is 125%.

Table 97. Comparison of automated counts and visual counts for Louisiana National Bank, Ruston, North Trenton St entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05.07.2025	8:00-10:00	26	1	30	1	115	100
05.07.2025	12:00-14:00	47	6	53	7	113	117
05.07.2025	15:00-17:00	24	5	31	7	129	140
Total		97	12	114	15	118	125

Figure 132. Camera view at North Trenton St entrance/exit (S2)

Table 99 provides further details on the visual and automated counts for each period for the total of both sides (S1 and S2). The overall accuracy for entering counts for total is 114%, and for exiting counts, it is 109%. Overall, the accuracy for exiting counts is accepted.

Table 98. Comparison of automated counts and visual counts for Louisiana National Bank, Ruston, North Trenton St entrances/exits (S1 and S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05.07.2025	8:00-10:00	33	22	37	24	112	109
05.07.2025	12:00-14:00	62	60	69	64	111	107
05.07.2025	15:00-17:00	33	39	40	44	121	113
Total		128	121	146	132	114	109

Week 15 Data Verification Checks for Park Ridge Apartment Complex and Rocky's Premier Carwash

Park Ridge Apartment Complex, Ruston, Alabama Ave Entrance/Exit

Figure 132 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 100 provides details on the visual and automated counts for each period. The accuracy for entering counts is 103%, and for exiting counts, it is 101%.

Figure 133. Camera view at Alabama Ave entrance/exit

Table 99. Comparison of automated counts and visual counts for Park Ridge Apartment Complex, Ruston, Alabama Ave entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05.07.2025	6:30-8:30	10	30	11	31	110	103
05.07.2025	12:00-14:00	17	24	17	27	100	113
05.07.2025	17:00-19:00	44	41	45	38	102	93
Total		71	95	73	96	103	101

Park Ridge Apartment Complex, Ruston, Goyne St Entrance/Exit

Figure 133 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 101 provides details on the visual and automated counts for each period. The accuracy for entering counts is 96%, and for exiting counts, it is 97%.

Table 100. Comparison of automated counts and visual counts for Park Ridge Apartment Complex, Ruston Goyne St entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05.07.2025	6:30-8:30	19	14	18	13	95	93
05.07.2025	12:00-14:00	12	10	11	9	92	90
05.07.2025	17:00-19:00	16	10	16	11	100	110
Total		47	34	45	33	96	97

Figure 134. Camera view at Goyne St entrance/exit

Table 102 provides details on the visual and automated counts for each period for both sides (S1 and S2). The overall accuracy for entering and exiting counts in total is approximately 100%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 101. Comparison of automated counts and visual counts for Park Ridge Apartment Complex, Ruston Goyne St entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/07/2025	6:30-8:30	29	44	29	44	100	100
05/07/2025	12:00-14:00	29	34	28	36	97	106
05/07/2025	17:00-19:00	60	51	61	49	102	96
Total		118	129	118	129	100	100

Rocky's Premier Carwash, Hammond, West University Ave Entrance/Exit

Figure 134 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 103 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 104%, and for exiting counts, it is 99%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 135. Camera view at West University Ave entrance/exit

Table 102. Comparison of automated counts and visual counts for Rocky's Premier Carwash, Hammond, West University Ave entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
01/29/2025	7:00-9:00	41	35	46	37	112	106
01/29/2025	12:00-14:00	65	57	71	61	109	107
01/29/2025	17:30-19:30	48	59	43	52	90	88
Total		**154**	**151**	**160**	**150**	**104**	**99**

Week 16 Data Verification Checks for Bayou Boil N Geaux and Dollar General, Robert

Bayou Boil N Geaux, Covington, North Hwy 190 Entrance/Exit

Figure 135 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 104 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 100%, and for exiting counts, it is 100%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 136. Camera view at North Hwy 190 entrance/exit

Table 103. Comparison of automated counts and visual counts for Bayou Boil N Geaux, Covington, North Hwy 190 Entrance/Exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	10:00-12:00	0	0	0	0	100	100
05/13/2025	13:00-15:00	15	15	15	15	100	100
05/13/2025	16:00-18:00	5	10	5	10	100	100
Total		20	25	20	25	100	100

Dollar General, Robert, U.S. Hwy 190 East Entrance/Exit

Figure 136 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 105 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 101%, and for exiting counts, it is 99%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 137. Camera view at U.S. Hwy 190 East entrance/exit

Table 104. Comparison of automated counts and visual counts for Dollar General, Robert, U.S. Hwy 190 East entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
02/21/2025	7:30-9:30	33	31	34	32	33	31
02/21/2025	12:00-14:00	67	62	69	64	67	62
02/21/2025	18:30-20:30	57	69	55	64	57	69
Total		157	162	158	160	101	99

Week 17 Data Verification Checks for Hancock Whitney Bank

Hancock Whitney Bank, Denham Springs, South Range Ave Entrance/Exit

Figure 137 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 106 provides further details on the visual and automated counts for each period. The overall accuracy for entering counts is 101%, and for exiting counts, it is 104%.

Figure 138. Camera view at South Range Ave entrance/exit (S1)

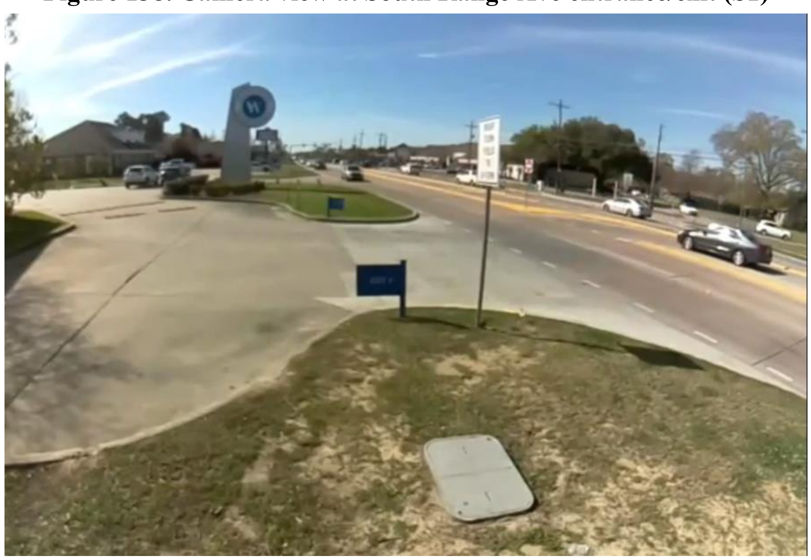


Table 105. Comparison of automated counts and visual counts for Hancock Whitney Bank, Denham Springs, South Range Ave entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
02/21/2025	8:45-10:45	40	41	43	42	108	102
02/21/2025	12:00-14:00	48	63	50	66	104	105
02/21/2025	14:30-16:30	55	64	51	67	93	105
Total		143	168	144	175	101	104

Hancock Whitney Bank, Denham Springs, Del Norte Ave Entrance/Exit

Figure 138 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 107 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 108%, and for exiting counts, it is 104%.

Figure 139. Camera view at Del Norte Ave entrance/exit (S2)

Table 106. Comparison of automated counts and visual counts for Hancock Whitney Bank, Denham Springs, Del Norte Ave entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
02/21/2025	8:30-10:30	35	31	36	35	103	113
02/21/2025	12:00-14:00	80	68	87	67	109	99
02/21/2025	15:30-17:30	79	64	87	67	110	105
Total		194	163	210	169	108	104

Table 108 provides further details on the visual and automated counts for each period, including the total for both sides (S1 and S2). The overall accuracy for entering counts for total is 105%, and for exiting counts for total, it is 104%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 107. Comparison of automated counts and visual counts for Hancock Whitney Bank, Denham Springs

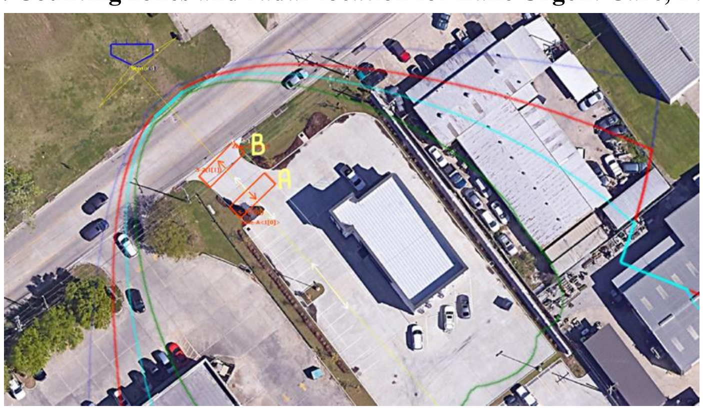
Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
02/21/2025	8:45-10:45	75	72	79	77	105	107
02/21/2025	12:00-14:00	128	131	137	133	107	102
02/21/2025	14:30-16:30	134	128	138	134	103	105
Total		337	331	354	344	105	104

Week 18 Data Verification Checks for Lake Urgent Care, Baton Rouge, and New Orleans Original Daiquiri, Gonzales

Lake Urgent Care, Baton Rouge

Figure 139 shows the location of the radar and the counting zones for the entrance and exit of Lake Urgent Care on Highland Road in Baton Rouge. As shown, the radar was mounted on the LTRC trailer at a height of six meters. The video camera was mounted on the utility pole to the south of the driveway. Three time periods were chosen for verification on February 13 from 11:30 to 13:30 and from 16:00 to 18:00, and on February 14 from 07:00 to 09:00.

Figure 140. Counting zones and radar location for Lake Urgent Care, Baton Rouge



There are major problems with the radar counts from this location. Very large numbers of short trucks were counted every 15 minutes throughout the measurement period. Based on the videos, only a very small number of short trucks ever entered the site. Ignoring the short truck counts altogether and comparing only to the car counts appears to have some merit, but the results are still unsatisfactory.

The comparison of the radar counts and the counts made from the video is shown in Table 109. The errors in the counts are very high. Several of the video counts were rechecked and found to be correct. However, the radar overcounted in all test periods. Compared to all vehicles reported by the radar, the entering counts show no resemblance to the true counts and are significant overcounts. Comparing only cars, the radar undercounts in all three test periods, though the undercount is not large. For exiting vehicles, the overcounts for all vehicles are again very large and show no pattern similar to the true counts. In this case, the car-only counts are still substantial overestimates.

Table 108. Radar counts and visual counts for Lake Urgent Care, Baton Rouge

Date/Time	Radar counts				Video counts	
	In		Out		In	Out
	Zone A		Zone B			
	All vehicles	Cars only	All vehicles	Cars only		
02/13/2025						
11:30 to 11:45	14	1	11	4	0	1
11:45 to 12:00	9	1	8	5	1	2
12:00 to 12:15	20	0	8	3	3	1
12:15 to 12:30	20	1	8	0	3	3
12:30 to 12:45	10	0	9	2	0	0
12:45 to 13:00	10	0	5	2	2	2
13:00 to 13:15	8	0	5	2	0	1
13:15 to 13:30	1	0	1	1	0	1
Total	92	3	55	19	9	11
Difference	+83	-6	+46	+8		
02/13/2025						
16:00 to 16:15	9	1	11	2	1	1
16:15 to 16:30	9	0	9	3	1	1
16:30 to 16:45	8	0	8	4	2	0
16:45 to 17:00	15	0	9	2	1	1
17:00 to 17:15	12	3	8	3	2	2
17:15 to 17:30	31	2	28	3	2	2
17:30 to 17:45	22	2	23	3	0	2
17:45 to 18:00	13	0	7	1	0	0
Total	119	8	103	21	9	9
Difference	+110	-1	+94	+12		
02/14/2025						
7:00 to 7:15	4	0	3	0	0	0
7:15 to 7:30	9	2	3	1	2	0
7:30 to 7:45	4	0	4	1	0	0
7:45 to 8:00	9	0	3	2	2	0
8:00 to 8:15	8	0	5	4	1	0
8:15 to 8:30	3	1	5	2	0	1
8:30 to 8:45	7	0	3	1	1	0
8:45 to 9:00	7	0	4	0	0	2
Total	51	3	30	11	6	3
Difference	+45	-3	+24	+8		

Overall, these results are not acceptably accurate. If time permits, this site should be considered for remeasurement using video cameras in place of the radar, which appears unable to distinguish between vehicles traveling on Highland Road and those turning into the facility.

New Orleans Original Daiquiri, Gonzales, LA 30 West Entrance/Exit

Figure 135 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. The distance from the camera to the exit opening makes exiting vehicles difficult to see in the frame, preventing reliable computer vision detection. Table 104 provides further details on the visual and automated counts for each period for entering vehicles only. The accuracy for entering counts is 94%. Overall, the accuracy for entering counts is accepted.

Figure 141. Camera view at LA 30 West entrance/exit

Table 109. Comparison of automated counts and visual counts for New Orleans Original Daiquiri, Gonzales, Louisiana 30 West entrance/exit

Date	Time	Visual entering counts	Automated entering counts	Entering counts accuracy %
02/17/2025	10:30-12:30	7	6	86
02/17/2025	15:30-17:30	23	22	96
02/17/2025	18:30-20:30	18	17	94
Total		48	45	94

Lake Urgent Care, Baton Rouge, Highland Road Entrance/Exit (Remeasured)

Figure 141 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used to remeasure the vehicle counts. Table 111 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 109%, and for exiting counts, it is 108%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 142. Camera view at Highland Road entrance/exit

Table 110. Comparison of automated counts and visual counts for Lake Urgent Care, Baton Rouge, Highland Road entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/20/2025	8:30-10:30	12	12	13	13	100	100
05/20/2025	12:00-14:00	11	5	12	5	109	100
05/20/2025	14:30-16:30	9	7	10	8	111	114
Total		32	24	35	26	109	108

Week 19 Data Verification Checks for Regions Bank, Zachary, and Dollar General, Port Allen

Regions Bank, Zachary, Main St Entrance/Exit

Figure 142 shows the camera view, which was installed at eye level. This camera was used to record the exiting vehicles. It was not possible to collect entering counts from this location. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 112 provides further details on the visual and automated counts for each period. The accuracy for exiting counts is 95%. Overall, the accuracy for exiting counts is accepted.

Figure 143. Camera view at Main St entrance/exit

Table 111. Comparison of automated counts and visual counts for Regions Bank, Zachary, Main St entrance/exit

Date	Time	Visual exiting counts	Automated exiting counts	Exiting counts accuracy %
03/13/2025	8:30-10:30	48	49	102
03/13/2025	12:00-14:00	47	45	96
03/13/2025	15:30-17:30	56	50	89
Total		151	144	95

Dollar General, Port Allen, LA 1 South Entrance/Exit

Figure 143 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 113 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 90%, and for exiting counts, it is 75%. Overall, the accuracy for entering counts is accepted.

Figure 144. Camera view at LA 1 South entrance/exit

Table 112. Comparison of automated counts and visual counts for Dollar General, Port Allen, LA 1 South entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
03/13/2025	7:45-9:45	21	15	16	10	76	67
03/13/2025	12:00-14:00	39	40	38	31	97	78
03/13/2025	18:30-20:30	46	46	41	35	89	76
Total		106	101	95	76	90	75

Week 20 Data Verification Checks for Brookstone Park Apartment Complex and PitStop Carwash

Brookstone Park Apartment Complex, Covington, Ochsner Blvd Entrance/Exit

Figure 144 shows the camera view, which was installed at eye level. This camera was used to record the exiting vehicles. The entering vehicles cannot be detected properly from that angle. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 114 provides details on the visual and automated counts for each period. The accuracy for exiting counts is 103%. Overall, the accuracy for exiting counts is accepted.

Figure 145. Camera view at Ochsner Blvd entrance/exit

Table 113. Comparison of automated counts and visual counts for Brookstone Park Apartment Complex, Covington, Ochsner Blvd entrance/exit

Date	Time	Visual Exiting Counts	Automated Exiting Counts	Exiting Counts Accuracy %
05/22/2025	7:00-9:00	70	71	101
05/22/2025	12:00-14:00	71	73	103
05/22/2025	18:00-20:00	33	36	109
Total		174	180	103

PitStop Carwash, Slidell, Gause Blvd East Entrance/Exit

Figure 145 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 115 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 101%, and for exiting counts, it is 97%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 114. Comparison of automated counts and visual counts for PitStop Carwash, Slidell, Gause Blvd East entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/11/2025	8:00-10:00	38	12	36	11	95	92
04/11/2025	12:00-14:00	64	28	64	26	100	93
04/11/2025	15:00-17:00	63	28	66	29	105	104
Total		165	68	166	66	101	97

Figure 146. Camera view at Gause Blvd East entrance/exit

Week 21 Data Verification Checks for First Guaranty Bank and Dollar General, Prairieville

First Guaranty Bank, Walker, Walker South Rd Entrance/Exit

Figure 146 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 116 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 103%, and for exiting counts, it is 100%.

Figure 147. Camera view at Walker South Rd entrance/exit (S1)

Table 115. Comparison of automated counts and visual counts for First Guaranty Bank, Walker, Walker South Rd entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:00-10:00	10	0	10	0	100	100
05/13/2025	12:00-14:00	17	1	17	1	100	100
05/13/2025	15:00-17:00	9	0	10	0	111	100
Total		36	1	37	1	103	100

First Guaranty Bank, Walker, Walker South Rd Entrance/Exit

Figure 137 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 117 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 100%, and for exiting counts, it is 113%.

Figure 148. Camera view at Walker South Rd entrance/exit (S2)

Table 116. Comparison of automated counts and visual counts for First Guaranty Bank, Walker, Walker South Rd entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:00-10:00	1	11	1	13	100	118
05/13/2025	12:00-14:00	4	21	4	24	100	114
05/13/2025	15:00-17:00	0	13	0	14	100	108
Total		5	45	5	51	100	113

Table 118 provides further details on the visual and automated counts for each period, including the total for both sides (S1 and S2). The overall accuracy for entering counts in total is 102%, and for exiting counts in total, it is 113%. Overall, the accuracy for entering counts is accepted.

Table 117. Comparison of automated counts and visual counts for First Guaranty Bank, Walker (S1 and S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	8:00-10:00	11	11	11	13	100	118
05/13/2025	12:00-14:00	21	22	21	25	100	114
05/13/2025	15:00-17:00	9	13	10	14	111	108
Total		41	46	42	52	102	113

Dollar General, Prairieville, LA 44 Entrance/Exit

Figure 148 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 119 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 95%, and for exiting counts, it is 93%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 118. Comparison of automated counts and visual counts for Dollar General, Prairieville, LA 44 entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
03/28/2025	7:30-9:30	16	15	15	14	94	93
03/28/2025	12:00-14:00	50	45	48	42	96	93
03/28/2025	18:30-20:30	56	59	53	55	95	93
Total		122	119	116	111	95	93

Figure 149. Camera view at LA-44 entrance/exit

Week 22 Data Verification Checks for Lake Urgent Care, Denham Springs, and Ron's Seafood Market

Lake Urgent Care, Denham Springs, Vincent Rd Entrance/Exit

Figure 149 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 120 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 95%, and for exiting counts, it is 95%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 150. Camera view at Vincent Rd entrance/exit

Table 119. Comparison of automated counts and visual counts for Lake Urgent Care, Denham Springs, Vincent Rd entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/07/2025	8:00-10:00	9	8	8	7	89	88
04/07/2025	12:00-14:00	7	8	7	7	100	88
04/07/2025	18:00-20:00	4	5	4	6	100	120
Total		20	21	19	20	95	95

Ron's Seafood Market, Denham Springs, South Range Ave Entrance/Exit (S1)

Figure 150 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 121 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 118%, and for exiting counts, it is 111%.

Figure 151. Camera view at South Range Ave entrance/exit (S1)

Table 120. Comparison of automated counts and visual counts for Ron's Seafood Market, Denham Springs, South Range Ave entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	10:00-12:00	3	3	3	3	100	100
05/13/2025	13:00-15:00	2	5	2	7	100	140
05/13/2025	16:00-18:00	6	10	8	10	133	100
Total		11	18	13	20	118	111

Ron’s Seafood Market, Denham Springs, Del Orleans Ave Entrance/Exit (S2)

Figure 151 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 122 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 108%, and for exiting counts, it is 97%.

Figure 152. Camera view at Del Orleans Ave entrance/exit (S2)

Table 121. Comparison of automated counts and visual counts for Ron’s Seafood Market, Denham Springs, Del Orleans Ave entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	10:00-12:00	16	11	19	10	119	91
05/13/2025	13:00-15:00	15	11	15	10	100	91
05/13/2025	16:00-18:00	17	16	18	17	106	106
Total		48	38	52	37	108	97

Table 123 provides further details on the visual and automated counts for each period, including the total for both sides (S1 and S2). The overall accuracy for entering counts in total is 110%, and for exiting counts in total, it is 102%. The accuracy for both entering and exiting counts is accepted.

Table 122. Comparison of automated counts and visual counts for Ron's Seafood Market, Denham Springs (S1 and S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/13/2025	10:00-12:00	19	14	22	13	116	93
05/13/2025	13:00-15:00	17	16	17	17	100	106
05/13/2025	16:00-18:00	23	26	26	27	113	104
Total		59	56	65	57	110	102

Week 23 Data Verification Checks for Bayou Butts and Booze and Rocketfast Carwash, West Monroe

Bayou Butts and Booze, Brownsville-Bawcomville, Thomas Rd Entrance/Exit (S1)

Figure 152 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 124 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 115%, and for exiting counts, it is 95%.

Figure 153. Camera view at Thomas Rd entrance/exit (S1)

Table 123. Comparison of automated counts and visual counts for Bayou Butts and Booze, Brownsville-Bawcomville, Thomas Rd entrance/exit (S1)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/23/2025	10:00-12:00	15	25	19	25	127	100
04/23/2025	12:00-14:00	19	29	24	24	126	83
04/23/2025	16:00-18:00	34	50	35	50	103	100
Total		68	104	78	99	115	95

Bayou Butts and Booze, Brownsville-Bawcomville, Dawn Ln Entrance/Exit

Figure 153 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. An automated counting tool using YOLO was developed for vehicle counts. Table 125 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 103%, and for exiting counts, it is 111%.

Figure 154. Camera view at Dawn Ln entrance/exit (S2)

Table 124. Comparison of automated counts and visual counts for Bayou Butts and Booze, Brownsville-Bawcomville, Dawn Ln entrance/exit (S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/23/2025	10:00-12:00	16	6	16	6	100	100
04/23/2025	12:00-14:00	17	6	18	7	106	117
04/23/2025	16:00-18:00	34	16	35	18	103	113
Total		67	28	69	31	103	111

Table 126 provides further details on the visual and automated counts for each period, including the total for both sides (S1 and S2). The overall accuracy for entering counts in total is 109%, and for exiting counts in total, it is 98%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 125. Comparison of automated counts and visual counts for Bayou Butts and Booze, Brownsville-Bawcomville (S1 and S2)

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/23/2025	10:00-12:00	31	31	35	31	113	100
04/23/2025	12:00-14:00	36	35	42	31	117	89
04/23/2025	16:00-18:00	68	66	70	68	103	103
Total		135	132	147	130	109	98

Rocketfast Carwash, West Monroe, Cypress St Entrance/Exit

Figure 154 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 127 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 104%, and for exiting counts, it is 99%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 155. Camera view at Cypress St entrance/exit

Table 126. Comparison of automated counts and visual counts for Rocketfast Carwash, West Monroe, Cypress St entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/22/2025	8:00-10:00	38	35	39	35	103	100
04/22/2025	12:00-14:00	73	83	77	82	105	99
04/22/2025	15:00-17:00	65	64	67	63	103	98
Total		176	182	183	180	104	99

Week 24 Data Verification Checks for Coastal Urgent Care

Coastal Urgent Care, Ruston, Service Rd West Entrance/Exit

Figure 155 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 128 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 105%, and for exiting counts, it is 76%. Overall, the accuracy for entering counts is accepted.

Figure 156. Camera view at Service Rd West entrance/exit

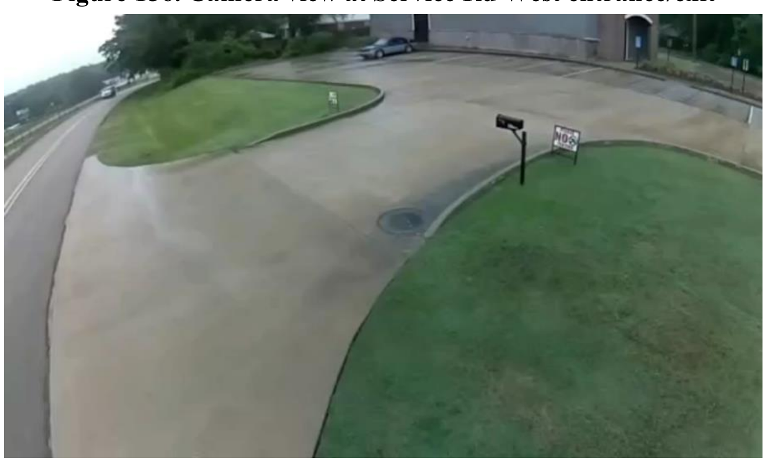


Table 127. Comparison of automated counts and visual counts for Coastal Urgent Care, Ruston, Service Rd West entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
05/06/2025	8:30-10:30	9	7	9	5	100	71
05/06/2025	12:00-14:00	13	18	14	14	108	78
05/06/2025	14:30-16:30	0	0	0	0	100	100
Total		22	25	23	19	105	76

Week 25 Data Verification Checks for Ashford Place Apartment Complex

Ashford Place Apartment Complex, West Monroe, Ashford Dr Entrance/Exit

This site has two entrances/exits, but at the time of recording, the gate on Netherland St was closed. Therefore, the counts were taken only at the gate on Ashford Drive. Figure 156 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 129 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 99%, and for exiting counts, it is 100%. Overall, the accuracy for both entering and exiting counts is accepted.

Figure 157. Camera view at Ashford Dr entrance/exit

Table 128. Comparison of automated counts and visual counts for Ashford Place Apartment Complex, West Monroe, Ashford Dr entrance/exit

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
04/22/2025	7:00-9:00	53	154	52	155	98	101
04/22/2025	12:00-14:00	69	74	72	74	104	100
04/22/2025	18:00-20:00	110	81	105	81	95	100
Total		232	309	229	310	99	100

Week 26 Data Verification Checks for Manchac Lake Apartment Complex

Manchac Lake Apartment Complex, Prairieville, Airline Hwy Entrance/Exit 1

Figure 157 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 130 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 100%, and for exiting counts, it is 104%.

Figure 158. Camera view at Airline Hwy entrance/exit 1

Table 129. Comparison of automated counts and visual counts for Manchac Lake Apartment Complex, Prairieville, Airline Hwy entrance/exit 1

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
11/04/2025	6:30-8:30	0	96	0	99	100	103
11/04/2025	12:00-14:00	1	43	1	47	100	109
11/04/2025	15:00-17:00	0	39	0	39	100	100
Total		1	178	1	185	100	104

Manchac Lake Apartment Complex, Prairieville, Airline Hwy Entrance/Exit 2

Figure 158 shows the camera view, which was installed at eye level. This camera was used to record the entering and exiting vehicles. Six hours were selected for verification: two in the morning, two in the afternoon, and two in the evening. YOLO was used for vehicle counts. Table 131 provides further details on the visual and automated counts for each period. The accuracy for entering counts is 101%, and for exiting counts, it is 95%.

Table 130. Comparison of automated counts and visual counts for Manchac Lake Apartment Complex, Prairieville, Airline Hwy entrance/exit 2

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
11/04/2025	6:30-8:30	24	57	25	52	104	91
11/04/2025	12:00-14:00	61	16	61	16	100	100
11/04/2025	15:00-17:00	97	25	97	25	100	100
Total		182	98	183	93	101	95

Figure 159. Camera view at Airline Hwy Entrance/Exit 2

Table 132 provides details on the visual and automated counts for each period for the total of both sides (S1 and S2). The overall accuracy for entering counts in total is 101%, and for exiting counts in total, it is 101%. Overall, the accuracy for both entering and exiting counts is accepted.

Table 131. Comparison of automated counts and visual counts for Manchac Lake Apartment Complex, Prairieville

Date	Time	Visual entering counts	Visual exiting counts	Automated entering counts	Automated exiting counts	Entering counts accuracy %	Exiting counts accuracy %
11/04/2025	6:30-8:30	24	153	25	151	104	99
11/04/2025	12:00-14:00	62	59	62	63	100	107
11/04/2025	15:00-17:00	97	64	97	64	100	100
Total		183	276	184	278	101	101