Clemson On-Campus Parking Problems

And Solutions With ParkWise Strategies

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Table Of Contents

Abstract:

The lack of parking availability at Clemson has caused continual delays and anxiety for students exacerbating the pressures already created by the university environment and distracting from the important goals of education and community engagement. In this report we will present the causes and effects of current parking problems, the potential solutions to resolve these issues, and the most effective plan for increasing parking availability at Clemson while maintaining reasonable budget constraints. An outline of the report is provided below

- Overhauling the Tigers Commute App
- Constructing a Subterranean Parking Garage
- Call to Action
- References
- Appendix

Clemson is currently plagued by a lack of student parking availability. Many students face significant delays due to searching for parking spaces. This increased hassle creates a barrier which prevents students from traveling to and from campus whenever possible. A lack of student presence on campus leaves students feeling disconnected and prevents the full realization of an active, excited campus community. To solve this issue will require increasing the amount of parking available on campus alongside empowering students to take charge of their commute. This can be accomplished through the construction of additional parking in the form of an underground parking garage in close proximity to main campus, alongside an overhaul of the current Tigers Commute app. In combination with each other these two measures will resolve long term issues with parking availability while empowering commuters both in the long term and in the immediate future. Overhauling the Tigers Commute app will be cost and time effective and allow students to more effectively plan their daily commute to and from campus; This will give students a feeling of empowerment and reduce their frustration with the current parking

situation. Building a new subterranean parking garage will significantly increase the amount of walkable parking available to commuters without compromising the look of Clemson's main campus. Altogether, this solution for Clemson's current parking issues will support the university's goals of a dedicated, involved student body and provide students with the resources they need to be successful students as well as successful members of the Clemson community.

Broad Background On Parking Challenges for Colleges:

Parking problems are pervasive across many universities and urban centers globally. Research from cities like Los Angeles and universities such as Stanford, and The University of California Berkeley, indicate that this is a growing concern, driven by increased population density and inadequate urban planning. A 2023 report from the International Parking Institute highlighted that nearly 70% of university campuses across the U.S. have faced parking issues that impact both student success and faculty satisfaction. As urban areas and university campuses grow, it becomes clear that expanding parking lots is not the best solution. A more comprehensive approach is needed, one that involves data-driven management, alternative transportation options, and infrastructure that supports long-term growth.

Local Problem: Clemson University

At Clemson, the parking scarcity is particularly pressing, with more than 20,000 students and a rapidly growing faculty population. The university has attempted to address the issue with new parking structures, but these expansions have failed to keep up with the rate of enrollment growth which is 2%. During peak times, parking lots near academic buildings are filled, forcing individuals to either park farther away wasting valuable time causing stress or resort to

unauthorized parking spots as an alternative solution which causes other businesses and people problems. Current solutions have focused mainly on reactive responses such as the construction of additional surface parking lots. While these efforts have helped alleviate some pressure in the short term, they have not fundamentally changed the way parking is managed on campus. Also, they are in inconvenient spots not near any classes. Furthermore, there is little integration of modern technologies, such as smart parking systems or mobile apps, which could optimize the usage of existing spaces and provide real-time information to users. These limitations have led to a continued increase in student and faculty dissatisfaction.

Problem Statement

The problem we have chosen to address is parking scarcity on campus at Clemson University. With the increasing population of Clemson students and faculty, the current parking facilities have proved inadequate. While Clemson is working to increase parking, their solutions are consistently behind the continual increase in parking demands. If Clemson does not radically change their approach to parking and shift from reactive to proactive solutions then students and faculty will continue to be negatively impacted. The scarcity of parking directly impacts the academic and professional experiences of the campus community. Students arrive late to classes or meetings, they are stressed and rushing, and are often forced to park in remote lots far away from class. This waste of time and energy not only causes frustration but also disrupts the educational mission of the university. Additionally, the inefficiencies contribute to environmental concerns, as drivers circle parking lots, consuming fuel and creating additional traffic congestion around the campus. Addressing this issue is crucial not only for the operational efficiency of the university but also for the well-being of its students and faculty in all aspects of their lives.

Criterion 1: Availability

Availability is the most fundamental criterion in solving the parking problem at Clemson. The ability to provide sufficient parking spaces for students and faculty will directly impact their daily commute and campus experience. Both proposed solutions aim to address this issue:

Solution 1: Underground Parking Garage: This solution would directly increase the number of available parking spots by adding 1,500-2,000 new spaces on campus. By reducing the need for students to park in remote locations, the garage would provide a more accessible and efficient parking solution.

Solution 2: Enhancing the Tigers Commute App: The app overhaul, including real-time parking availability tracking, would indirectly increase parking availability by helping users find open spots quickly, thereby reducing congestion in full lots.

Both solutions aim to increase availability, but Solution 1 addresses this criterion more directly by increasing the physical number of spaces, while Solution 2 provides a digital solution to optimize existing parking resources to reduce congestion and stress trying to locate a parking space.

Criterion 2: Time Efficiency

Time efficiency is critical for Clemson's community, as students and faculty need to minimize the amount of time spent searching for parking. This criterion directly impacts productivity, stress levels, and overall satisfaction with the campus experience.

Solution 1: Underground Parking Garage: An underground garage positioned strategically on campus would minimize the distance students and faculty need to travel between

their cars and classes, reducing time spent commuting. The addition of this garage would significantly cut down on time spent searching for parking, thereby improving overall time efficiency for users.

Solution 2: Enhancing the Tigers Commute App: With real-time parking availability and bus schedules, the app would allow students to quickly identify available spots or alternative transportation options. This would reduce the time spent driving around campus in search of parking and also provide flexibility in choosing between parking and taking the bus. The increased accessibility to real-time information would greatly enhance time efficiency, making it easier for users to plan their commutes. As the current app does do this, it has many areas for improvement as the app has proven non-effective and doesn't work properly from time to time.

Both solutions would improve time efficiency, but the garage would provide a more tangible reduction in commute times, while the app's digital features would enhance flexibility and convenience.

Decision Criterion 3: Cost-Effectiveness

Considering the budget constraints of Clemson University, cost-effectiveness is a critical factor in determining which solution to pursue. Each solution involves different financial commitments and operational costs, which are taken into great consideration

Solution 1: Underground Parking Garage: While the construction of an underground parking garage would be an expensive project, potentially costing around $40 million, it is a long-term investment that would provide significant value in terms of parking availability. However, it would likely require additional funding through increased parking fees or other

sources of revenue to cover the costs. The ongoing maintenance costs for the garage would also need to be considered. The investment could be worth it in the future as long as the garage is maintained well.

Solution 2: Enhancing the Tigers Commute App:

Overhauling the app is a much more cost-effective solution compared to constructing a parking garage. The app enhancement would involve the development of real-time parking data and bus schedule integration, as well as the installation of parking sensors in key parking lots. The initial development cost would be lower than constructing a garage, and the maintenance would be less expensive. Additionally, the app would be operational much sooner than the parking garage, providing quicker returns in terms of improving the user experience.

While Solution 2 is more cost-effective in the short term, Solution 1 may be more beneficial in the long term, provided sufficient funding is secured for the project as it will make a greater overall benefit to the parking problems at Clemson.

Solution 1: Underground parking garage

Our first solution is to directly increase the amount of parking available by constructing an underground parking garage on Clemson's campus. This solution will maintain the beauty and architectural style of Clemson, two important factors for cultivating the atmosphere and community at the university. An underground parking garage will be almost entirely out of sight thus won't conflict with Clemson's preserved beauty and architecture from a multitude of structures dating back to the late 1800's. This solution will also effectively utilize the available space on campus. As we discovered from communications with Clemson's head of parking services, on campus space at Clemson has been nearly exhausted. Creating an underground

garage will minimize the amount of space being used by maintaining above ground usability. If constructed mindfully, it would be possible to initiate further projects in the future that will transform the top of the parking garage into classrooms, study rooms, or a restaurant for Clemson's students in addition to the below ground space being used for parking. Additionally, we know that parking and availability is a huge problem from our survey which shows not a single person is completely satisfied with current parking on Clemson's campus. Our garage will be 5 stories down underground with approximately 250 to 300 spots per level. Such a project will improve both time efficiency and parking availability here at Clemson.

An underground parking garage would improve time efficiency in many ways. Firstly, by increasing the availability of on campus parking, this garage will reduce the amount of time students spend looking for spaces.. Additionally, the garage could be constructed closer to the main campus than current larger parking lots, reducing the time spent walking to classes.

Constructing a subterranean parking garage will directly increase parking availability by greatly increasing the number of spaces available. An additional parking garage will also draw in commuters who are currently using other lots, meaning that the increase in parking availability will be felt across campus and not just in the area where the lot is constructed.

We expect to create approximately 1500 to 2000 more parking spots with our 5 story deep underground garage. That would increase overall parking on campus significantly but also increase many other smaller factors for students driving to class. It will help with time, gas and money, and relieve a factor of stress for students. By increasing availability of parking spots it will create a chain effect and improve multiple aspects of a Clemson student's everyday life.

After some research and further analysis, the project of a 5 story underground parking garage has potential for Clemson as there are many benefits. Though the physical construction

and budget for it is where some problems could potentially occur. Firstly there are complications with construction. As there was no exact map of all the underground piping of Clemson it was tough to gauge the complications with utilities construction could cause. There are also issues surrounding the Lake Hartwell watershed as we would need a spot not prone to flooding which would not interfere with drainage into the lake. Price is another other major issue as an underground parking garage is substantially more expensive than an above ground garage, though we strongly believe the benefits of the underground garage outweigh the costs. To construct the garage would require a minimum investment of $40 million dollars. This is expensive but definitely can be justified through the significant benefits of availability, time efficiency, and holistic improvements to Clemson student's life. Finally, there is the issue of time. Construction for such a complex project would require significant time investment and would not provide short term relief to Clemson's parking issues. Luckily, the most significant issues facing this solution can be resolved, as will be discussed later.

Solution 2: Implementing a parking management app/system

The second possible solution is to more efficiently utilize Clemson's current transportations resources through an overhaul of the Tigers Commute app. We suggest overhauling the app through the inclusion of a real time availability function for parking and bus schedules alongside the elimination of the need to create individual commutes in the app. These changes will give students easy access to updated information regarding their transportation options.

The first ParkWise decision criteria for developing more efficient student parking is availability. Fixing the issues with the Tigers Commute app would increase availability in two

ways. Firstly, the app would increase the ease of access to real time bus schedules creating greater incentives for students to use the buses and thus increasing parking availability. Currently, the only way to see the real time bus information is on the CATbus website. Moving this information to an app not only makes it more accessible, but will also increase the number of people looking at the bus routes. This is because drivers who are using the app to look for a parking space may notice that a bus is about to arrive heading for their destination. The cross integration between bus riders and drivers through this app will help bridge the gap between the two groups allowing students to flexibly utilize both options depending on what is most efficient for them.

The increased flexibility such an app would give to students leads directly into the second way that the app would increase availability. By giving commuters access to more information about what spots are available, what lots are empty or close to being full, and what options they have regarding bus routes, students are empowered to control their schedule. While this empowerment does not increase parking volume directly, it does improve commuter sentiment and shows them what options are available, functionally increasing parking availability.

Our second decision criteria is time efficiency which is met by this solution through the reduction of time wasted. As has been stated, the improved app would show which parking lots have available spaces and how many. This cuts down on the time students spend driving around campus looking for spaces to park as they can plan to park in lots with high availability. Even if a student would prefer to park in a particular lot that is nearly full and then cannot find a spot upon arriving to campus, they could still use the app to see which lots are available, giving them a back up plan and cutting down on time spent aimlessly driving around in frustration looking for a spot. This increased capability to find spaces quickly not only decreases the time spent looking

for a space, but saves that time from a student's commute. Many students must leave for class well before the class actually starts just to ensure that they can find a spot. In the best case scenario this still leads to students finding a spot with plenty of time to spare and then having to wait, either in their car or outside their class, during the extra time they allotted just in case there was difficulty finding a spot. Empowering students to take control of their commute through this app would also free up this lead time so students could put it towards more valuable activities.

Implementing this solution is feasible without major disruption to the current parking system or major construction. To implement this solution would require both an overhaul of the current Tigers Commute app and the construction of parking sensors. The current Tigers Commute app is not very well liked, boasting thirty reviews and an average rating only slightly over one out of five stars. Most users are frustrated with the app because it is difficult to use and requires users to put in individual commutes that occur at regular intervals. This requirement does not conform with how students usually travel as it forces them to have a completely rigid schedule; furthermore, the feature does not empower students to utilize the app whenever and however it is convenient for them. The second requirement to implement this solution is the installation of parking sensors in the majority of commuter parking. While still potentially expensive, this task is much cheaper than alternative solutions which involve creating more spaces.

This solution is a good fit for both the university of Clemson and Clemson students. An app overhaul would be comparatively inexpensive for the university and, once installed, would require minimal maintenance or oversight from university authorities. The lack of need from oversight stems from the same reason that this solution is effective for students. An overhauled app would put the responsibility onto students for crafting an efficient commute given complete

information. This solution is realistic and empowers students to improve their commutes. The only potential issue lies in the fact that the underlying lack of spaces to park at Clemson would remain unaddressed. Luckily, the issues with these solutions can be easily resolved through multisolution integration.

Solution Synthesis

Both of our proposed solutions face opposite issues. The overhaul of the Tigers Commute app will have a significant impact on availability, time efficiency, and student sentiment in the short term, but will not resolve the underlying issue of a lack of parking spaces on campus. An underground parking garage is the inverse as it will take a longer time and higher costs to implement, but will significantly increase the total parking available on campus. The optimal solution is to synthesize these two options. Overhauling the app is a low cost solution that will mitigate the severity of parking availability problems in the short term. This mitigation of the underlying issue will allow time for funds to be raised and construction to begin on the subterranean parking garage allowing a seamless resolution of the parking availability issues here at Clemson.

Call To Action

As Clemson University continues to grow in student enrollment, the demand for accessible and efficient parking has become an increasingly pressing concern. With thousands of students commuting to campus daily, the current parking infrastructure has struggled to keep pace, leading to frustration, delays, and overcrowded lots. Addressing this issue is not only feasible, but essential for supporting a positive campus experience and maintaining efficiency. Through a combination of innovative technology, strategic construction projects, and sustainable

transportation initiatives, Clemson is actively working toward realistic and impactful solutions to improve parking across campus.

Clemson University is taking a significant step towards modernizing its parking system by installing over 10,000 smart parking space sensors across campus. These sensors are designed to detect vehicle presence in real time, allowing for accurate and up-to-date monitoring of parking space availability. The data collected will be seamlessly integrated into the existing Tigers Commute app, giving students, faculty, and staff immediate insight into where parking is available before they even arrive on campus. Additionally, digital display boards will be placed at key entry points and major parking lots to further assist commuters in locating open spots quickly and efficiently. This real-time tracking system aims to significantly reduce the time spent circling lots, campus traffic congestion, and enhance the overall commuting experience. By embracing this smart technology, Clemson is not only improving convenience but also moving toward a more sustainable and data-driven approach to campus transportation management.

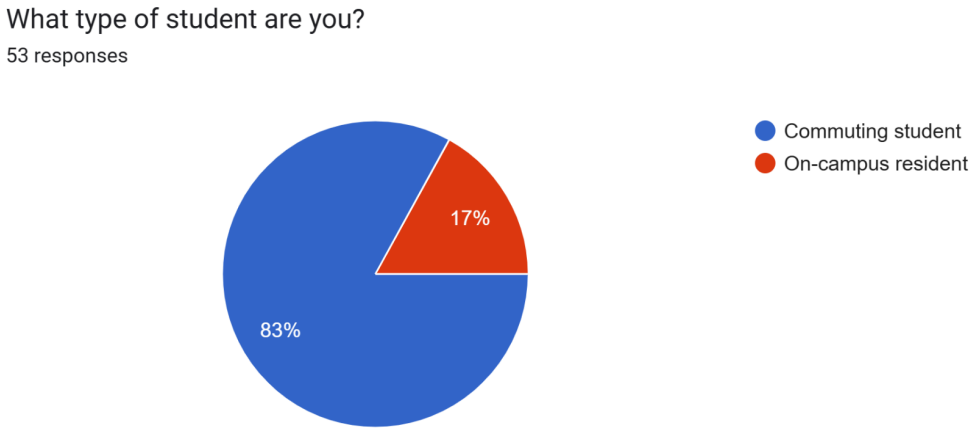
As Clemson University continues to expand, one proposed solution to the campus parking shortage is the construction of an underground parking garage. This approach offers a unique advantage: it allows the university to significantly increase parking capacity without compromising the visual appeal or open green spaces. By building below ground, Clemson can preserve the natural landscape, maintain architectural continuity, and minimize disruption to the campus environment. While underground construction can come with higher initial costs, the long-term benefit of maintaining the university's aesthetic integrity and cohesive campus design makes it an appealing and forward-thinking option. This project is part of a broader long-term strategy to improve transportation efficiency and accessibility on campus. With parking availability being a persistent concern among the university community, the underground parking

garage represents a practical, long-term investment in Clemson's infrastructure. The garage is expected to reduce traffic congestion during peak hours and minimize the reliance on remote park-and-ride options, offering students a more direct and convenient parking solution.

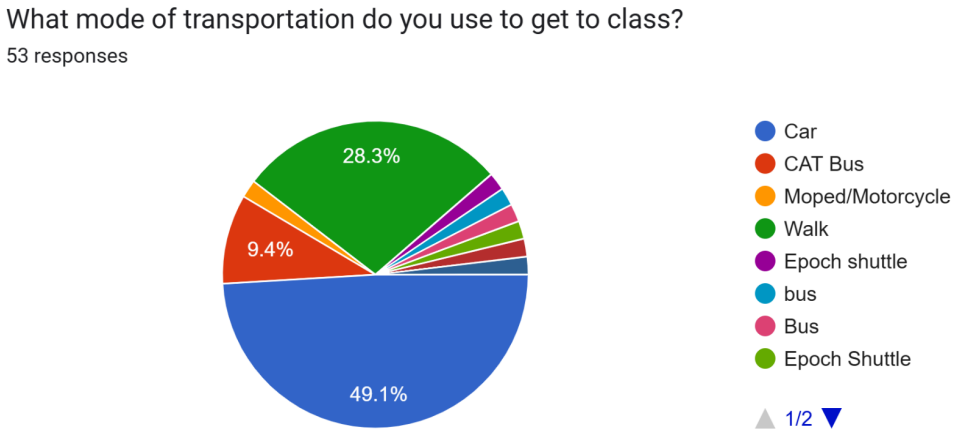
While addressing parking issues at Clemson University involves significant planning and investment, the combination of infrastructure projects and alternative transportation initiatives demonstrates a feasible and proactive approach to improving parking conditions on campus. With the addition of smart parking technologies like space sensors, mobile app integration, and digital signage, Clemson is making it easier for students and staff to navigate parking efficiently. Simultaneously, major construction projects—such as the underground parking garage—show a clear commitment to expanding capacity without sacrificing the university's aesthetic appeal. These efforts, paired with long-term strategies to promote carpooling, public transit, and pedestrian access, reflect Clemson's dedication to sustainability, accessibility, and campus functionality. By taking these steps now, the university not only addresses current challenges but also positions itself to support a growing community in the years to come.

Appendix: Survey Results:

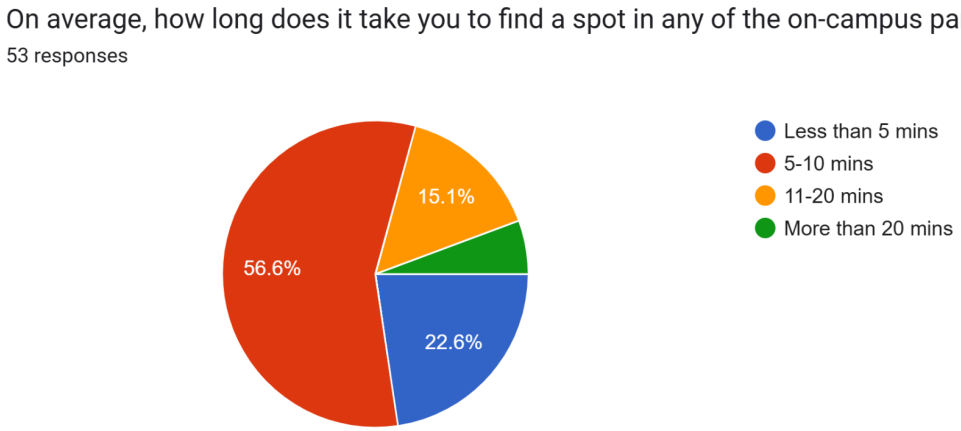
Our 8 question survey was sent out to Clemson students to gather their insight and opinions on the parking and transportation situation on campus.



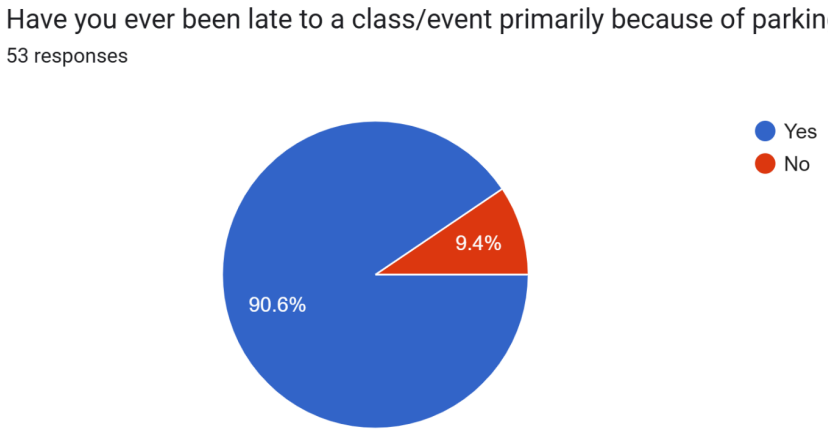
This first visual identifies the location where the survey participants live. On-campus residents live in dorm rooms or on-campus apartments, while commuting students live off campus and have to utilize transportation to school. An overwhelming 83% of the participants live off campus, meaning they either drive or take other transportation methods daily.



The majority of the participants use personal vehicles to commute to campus. Cars are the most common mode of transportation, which identifies the relevance of the parking issue on Clemson's campus.



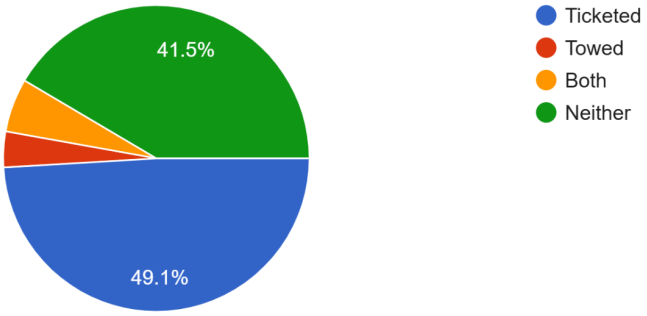
The most frequent amount of time the participants spend finding a spot on campus is between 5-10 minutes.



A staggering 90% of our participants have been late to a class or event because of parking issues. This highlights the impact the parking issues have on student's daily lives.

Have you ever been ticketed or towed on campus during normal class hours? (8:00am - 4:30pm, before employee spots are available for student use)

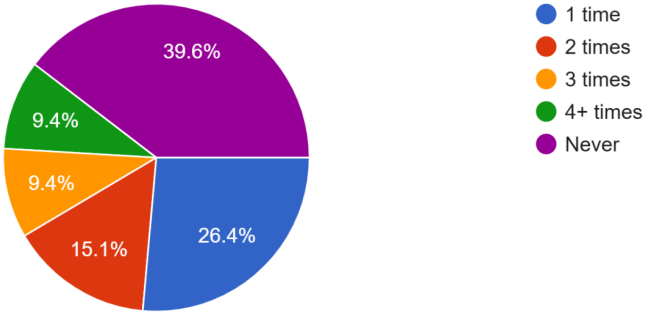
53 responses



Nearly half of the participants have been ticketed. However, some of these incidents could be result of illegal parking.

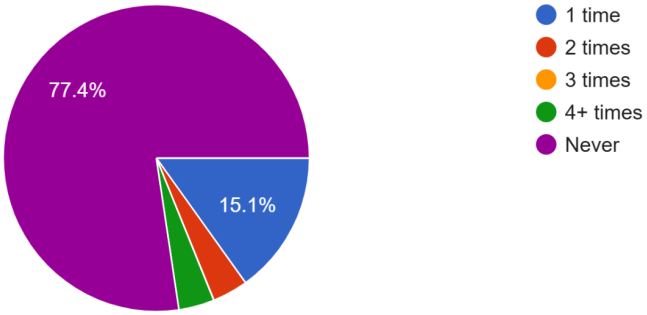
How frequently have you been ticketed?

53 responses



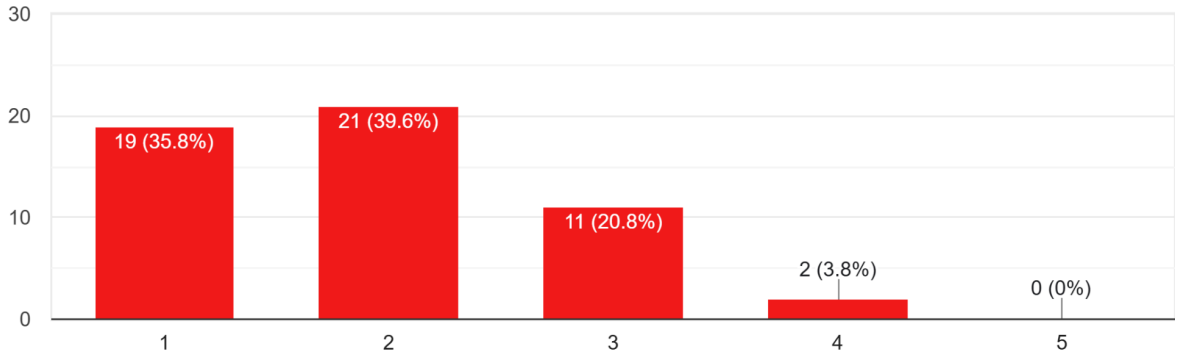
How frequently have you been towed?

53 responses



How satisfied are you with the proximity of parking to main campus?

53 responses



Overall, the majority of our participants are unhappy and dissatisfied with the state of parking at Clemson. They feel the proximity to campus is inadequate, and have mostly all had issues with missing class or important events. This survey allowed us to contextualize the issue and draw conclusions that further affirm our reasoning behind our feasibility study, the problem statement, and our intended solutions.

References

Author Unknown. (2024, April 10). CU trustees receive update on $80M parking garage. *Upstate Today*. https://upstatetoday.com/news/cu-trustees-receive-update-on-80m-parking-garage/article_ab43b7d6-f7ae-11ee-8d22-676dae55de75.html

Clemson Parking Sucks. (n.d.). *https://clemsonparkingsucks.wordpress.com*

Clemson Parking and Transportation Services. (2025). *Ridership.* https://docs.google.com/spreadsheets/d/1qo8FWlFYeMRRoWVj-lwm0774kj3GWzrl/edit?usp=sharing&ouid=100235671715173418236&rtpof=true&sd=true

Clemson University. (n.d.). *Parking and permits*. Clemson University. https://www.clemson.edu/campus-life/parking/parking-permits/index.html

Real, R. (2023, August 11). *Employee parking updates for fall 2023*. Clemson News. https://news.clemson.edu/employee-parking-updates-for-fall-2023/

Sikes, P. (2023, August 17). *Student parking and transit updates for Fall 2023*. Clemson News. https://news.clemson.edu/student-parking-and-transit-updates-for-fall-2023/