2012

Inquiry to
Innovation

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[TEAM SPOT-U; PARKING AND ACCESSIBILITY IN AND AROUND CORRYVILLE]

This report contains all information relevant to Team Spot-U's solution to the parking and accessibility problems that exist in and around residential Corryville. Through consultation with stakeholders, research, game-storming, and the guidance of Francis Russell, Team Spot-U was able to develop several applicable solutions. The process of creating those solutions, and the solutions themselves, are detailed in this report.

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Chapter 1: The Challenge

The challenge was brought issued by a group of stakeholders. Kay Weaks is an active community member, serving on the Corryville Community Council, and partaking actively in decisions concerning new urban developments throughout the community. She is highly involved in the parking situation, and preventing the overproduction of parking facilities that could detract from the value of the neighborhood. Jack Martin, a retired designer of Cincinnati, was also present to present the challenge. He has a lot of experience in the area we were studying, and was extremely valuable throughout the innovation process. Nathan Wessel was also present to issue the challenge. He is an urban planner in the area and offered an interesting view on the challenge presented. Kay, Jack, and Nathan all offered very different perspectives on the issue, which granted a wider scope on the actual problem.

Kay's approach was that of a resident. She described the challenge thusly. Parking is a major issue in Corryville, and it exists primarily as congested free parking on the streets of residential neighborhoods. The theme was that there are too many cars, and not enough spaces. Due to the lack of available space, cars parked on the street are often parked dangerously, and other cars still are parked illegally. Either they are on the street in the same spot for over 14 hours without being moved (this is illegal), they are blocking driveways, they are too far from the curb, or they are parked in someone's lawn. All of these parking decisions present a danger to other motorists, and detract from the value of the neighborhood. Her priority was to fix this congestion, and make her neighborhood attractive, and safe for all motorists. She really values and takes pride in Corryville, and that is her primary desire for fixing the parking problem in the area. In summary, Kay's challenge was presented as reducing the congestion and undesirable parking in Corryville.

Jack Martin presented the issue with less attachment to the community of Corryville than Kay showed, but his investment in the issue remained clear. He and Kay shared a lot of the same views on parking. He too seemed to think that parking congestion on the residential streets was the biggest issue that we should try to resolve. The fact that so many people are trying to park in the street for free, while ignoring some of the costly garage or lot parking available in the neighborhood, was stated as a cause of the problem. He seemed to believe there was a solution to the problem, and that this solution was not to build another garage. Jack Martin, being familiar with parking controls like parking meters and residential parking permits, knew these could be potential solutions, but did not present these solutions to us. He did not want to overly influence the path of our solution.

Nathan Wessel's approach differs slightly in his presentation of the challenge. He noted that in the area, as a general rule, there are three parking spaces for every vehicle. Therefore, the reason for congestion should not be just a lack of parking spaces. He cited the cause of congestion to be the natural tendency to park as cheaply and easily as possible. The residential streets of Corryville lend themselves very well to this easy parking. The parking there is free, and close to many popular destination like the university and surrounding commerce. Nathan stated that a way to get motorists to park socially responsibly should be the ultimate goal. If everyone parked ideally (ie. safely, legally, and in a location that allows everyone to park somewhat near their destination) then the parking congestion and the problems that come with this congestion can be resolved. Motivating this responsible parking is the challenge. As a result of his view points, he explicitly told us that he would like to see a solution that does not involve a new parking garage, or even a traditional permit program or metered parking. He was trying to make us truly innovate a solution.

Our other stakeholder, Weston Munzel, was not present for the presentation of the challenge, and was only present later, after we showed our stakeholders our conjecture. His ideas will be discussed then, in Chapter 3.

In summary, we saw the challenge as follows. The congested street parking throughout the residential are of Corryville needs to be fixed. This crowding of cars causes dangerous and undesirable parking decisions. By alleviating the stress on free parking, the streets would also be made safer and more attractive. Thus, by lowering the congested street parking, motorists, and the neighborhood as a whole can benefit.

Chapter 2: General Research

In order to more effectively do the research we deemed necessary to solve the problem, we created a critical pathway. This pathway is a diagram that allowed us to stay on track and make sure pertinent research and development of our ideas was performed.

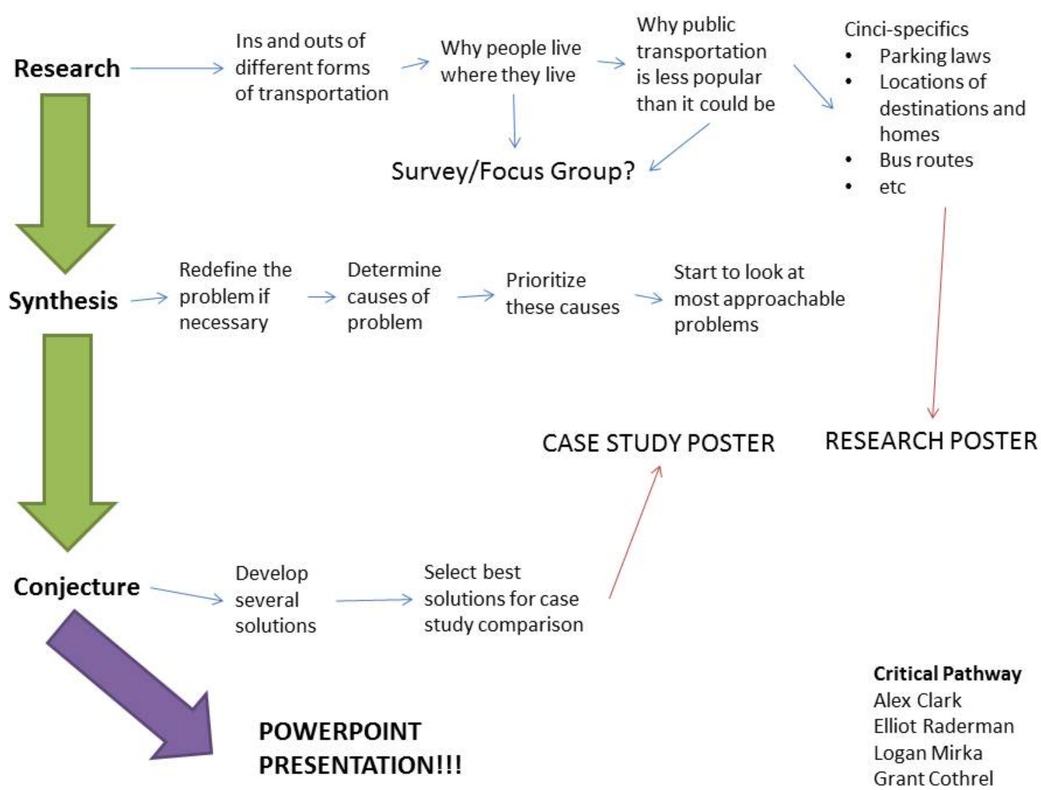


Figure 1: Critical Pathway

Our plan had three major steps: Research, Synthesis, and our Conjecture. In this chapter, we will only discuss the research and the synthesis that took place. Chapter 3 is dedicated to the conjecture.

In this initial plan, we intended to make a survey or focus group. The goal of this would be to gain insight into human behavior and how it applies to parking. By understanding how people are motivated to park, we could create a solution that is catered to these human tendencies. We also planned to do additional research on how Cincinnati's transportation systems function. This would be performed through internet research, phone calls to the UCPD, and the study of various Cincinnati reports on transportation. Each team member was assigned tasks from this critical pathway.

Critical Pathway Job Assignments

Logan: Face, Elliot: Legal, Alex: Research, Grant: Research, Scribe

Ins and Outs – Grant – extensive internet research

- Taxis
- Metro- practicality- making more useable
- **SORTA, metro, and bike PROMOTION**
- Number of cars at UC and in residential areas
- LOOK AT: Parking guy interview?
  - How are permits granted?
    - On basis of status? Cost?
- New parking garage on Calhoun

Why people live where they do – Logan on contacts, the rest on questions and helping lead the group. Looking to Prof. Russell for help here!

- Focus Group – 10 people?
- Find members to join the group – Residents, on campus, commuters, off campus noncommuters
- Questions to lead the focus group
  - Why live where they do?
  - Why public transport not used more???

Cincinnati- specific laws on parking – Elliot contacting Cinci PD

- What can get you a ticket
- Driveway restrictions and requirements
- Effectiveness of ticketing violators/Number of violations

How other universities successfully attack parking situation – Alex and Grant

- Other universities where cars are not allowed
  - For freshman

For all students

Other universities where parking is charged

How pricing effects number of cars at university

Parking Guy – need contact info from Prof. Russell – Logan

Interview Questions:

How many student cars park at UC?

How many faculty cars park at UC?

How many spots are there on campus?

How many parking violations occur on campus?

Can you describe how parking prices are set?

What is the biggest complaint about on campus parking?

Guy who offered problem – need contact info from Prof. Russell – Logan

Questions:

Ask for contacts

Run our ideas by him

New Parking garage?

Of course, this was the plan at the beginning of our research, late October, 2012. The research that we performed did deviate from this plan, and it will be outlined in the remainder of this chapter.

What really occurred is more accurately reflected in what we called a to-do list which was made on the first of November, 2012.

TO DO 11.1.12

Alex-

Survey students

What mode of transportation would you use?

Frequency of use?

What would it take for you to not bring your car?

Do you park your car on campus, or just off of campus and then walk the rest of the way?

Goal is to show that public transport is under-utilized

Logan-

Information of the buses, contact with Parking Guy

Ask about free bus passes

Interview Kay and Jack Martin – **ask for what they think is the problem**, how many spots are actually necessary for nonstudent residents, and how many are available to nonstudent residents? Ask him for a Cinci parking contact as well. Are cars mostly residential or just students?

Jack- 5134845067?

FOCUS GROUP with students

STUDENTS- commuter, on campus groups

Where do you live? Do you have a car? What year are you? Did you have a car in past years? Did you have a car before college? Do you have an issue with parking? What would it take to give up your car? How is parking in the summer?

Elliot-

Parking on campus and around campus

Cinci PD

Number of parking violations and repeat offenders

Laws on driveways and street parking –

How are tickets handled? Paper? Digitally?

Are garages and lots full?? – UCPD

Do you have to register your car even if you don't park on campus?

Parking Guy – how spots are distributed, are garages supposed to be all the way full? Etc.

Does UC sell more parking permits than there are spaces?

How are tickets handled? Paper? Digitally?

Would you say the process of giving tickets is cumbersome with the large driver population?

Grant-

All-time scribe

Case studies on parking at other universities

On campus parking and off campus parking- College Prowler "best college parking"

How other campuses tackle parking issue

All-

Document what we see on the street

Make sure our pathway jobs are different, specific, and quantifiable.

Interview questions for Kay and Jack.

Figure out what info we want from the police records.

Conjecture ideas.

Figure 2: To Do list 11.1.12

Even so, edits to our plan of action were made as the research process occurred. The focus group aforementioned was replaced by dialogue between us and our stakeholders.

The following subsections detail our research and how these findings applied to the challenge we were facing.

Observations

The team was encouraged to make personal observations about parking and public transportation. This first person insight was crucial to our understanding of the problem as it exists, and to the development of appropriate solutions. When people do not have sufficient space to park safely and closely to their destination, they will often park closely to their destination, but park unsafely. This unsafe parking detracts from the value of the neighborhood and others' ability to park safely. The following images, taken by members of team Spot-U, show how dangerous and undesirable parking can be when the streets are crowded. People park in lawns, distant from the curb, blocking sidewalks, and sometimes a vehicle will sit in the same place on the street for months without being used, occupying a space that someone else who needs their car could use.

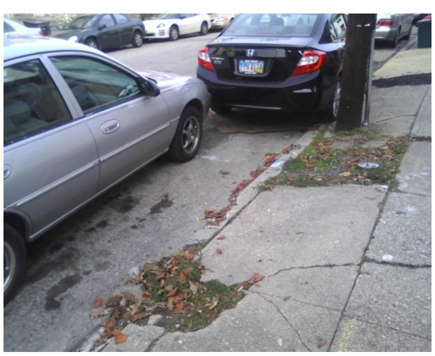


Figure 3: Shown violations starting at the top left and going counter clockwise are: 1 and 2) parking on lawn. 3) blocking driveway and far from curb. 4) blocking sidewalk. 5) no violation, but crowding is present

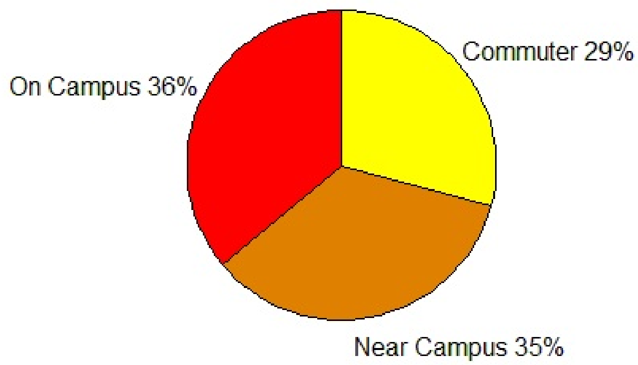
Student Survey

The goal of the student survey was to learn where students were parking their cars, how often they use their cars, and why they have a car. By asking questions to determine this and other relevant information, we were better able to understand the mentality of owning a car and bringing it to the University of Cincinnati campus area.

85 UC students of various grades and majors were surveyed in late October of 2012, using "SurveyMonkey.com." The selection of those taking the survey was not statistically random, but still provided a good idea of general trends.

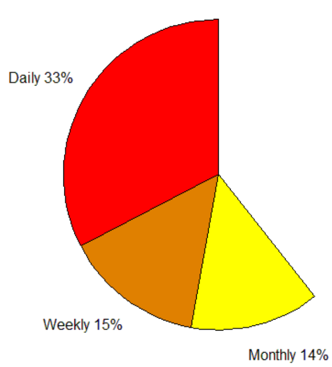
Questions

<u>Where do you live relative to campus?</u>



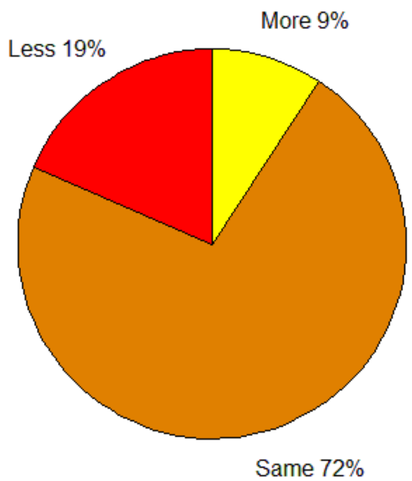
This gave us a general overview of where students were living so we could design our solutions to fit certain groups. Since the relative size of each category was similar, not too much had to be changed in our solution's approach.

<u>If you have a car, how often do you use it?</u>



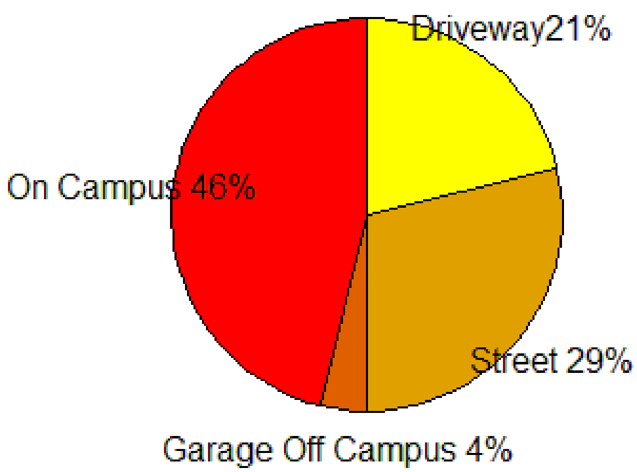
We wanted to know how often the cars that take up space around campus were being used. The noticeably large chunks in the weekly and monthly category led us to believe that our later solutions like long term parking, zipcars, and the metro could be used effectively by students (see Chapter 5 for final proposed solutions).

Compared to how often you use your car now, do you think you could use it less, more, or as often as you do now?



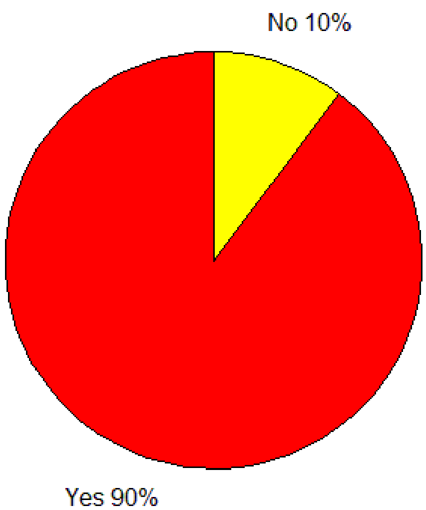
The overwhelming majority of students who believed they needed their car as much as they used it now suggests that our solutions would have to be incentivized before a significant amount of students would get on board with our ideas.

Where do you most often park your car?



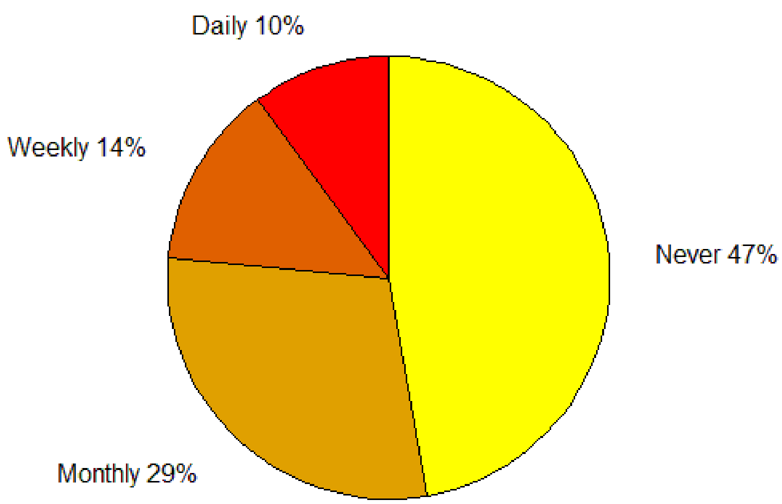
Even though a large percentage of our survey population was most likely freshman (who have to live on campus their first year), a third of all surveyed most often parked their car in the street. This led us to believe that solutions that got students to keep their cars off residential streets would definitely lead to less crowded streets and easier parking.

Did you have a car for your own personal use before coming to college?



Since many college kids came to the city from a suburb, a solid majority are used to having a car for their own use available at any time. This can show pretty clearly why many students have a hard time giving up their car in the transition to college life.

Have you ever used public transport, and if so, how often?



This was a very interesting result when it came to creating our solutions. With almost half of students never having used the metro or a similar system, we knew that we had to incorporate a specific solution geared to promoting public transport into our overall finished design.

Public Transit

We investigated several forms of available public transportation, because they can increase a person's accessibility to their destination, both by transporting a person and by decreasing the number of personal vehicles necessary in an area.

Zipcars

One of the alternatives we explored was Zipcars. These shared cars provide students with a sense of personal use without actually needing to bring their own cars to campus. For the infrequent user, these also present a significant savings over ownership on campus since Zipcars require a mere twenty dollar annual membership fee and a usage rate of seven dollars per hour. Users are not responsible for gas used, maintenance on the vehicles, drivers insurance, or the cost of parking on campus since they have their own designated spaces to return the cars to when not in use (zipcar.com).

The Metro

The Metro bus system is a very well-established bus system that runs throughout greater Cincinnati. The Metro offers a multitude of solutions to make riding accessible to as many people as possible including Bike and Ride as well as their own Park and Ride locations. The buses are also handicap accessible, so that almost anybody can ride. Currently, students are eligible for free discount passes or fifty dollar passes that grant unlimited use throughout zone one, which encompasses the city of Cincinnati itself. We investigated the routes that the Metro provides, and found that there are effective routes in existence between the UC Corryville area, downtown, and the Greater Cincinnati area. Routes currently provide accessibility to a wide range of desired destinations (go-metro.com).

It was discovered that many people at UC are unfamiliar with the bus system, the Metro. They do not know its routes, or the timing of these routes. An article by David Alpert, titled *More People Will Ride Buses Only if Information Gets Better* confirmed this notion that people fail to ride the bus out of lack of information. The bus is a completely foreign topic to many. But, if the information could be more conveniently and clearly communicated to the student body, many more may become riders. When people do not ride the bus and they drive instead, this adds to congestion of the free street parking in Corryville. If buses and similar shuttles were more widely used instead of personal vehicles, this could drastically cut down on the parking congestion problem and provide greater accessibility to all.

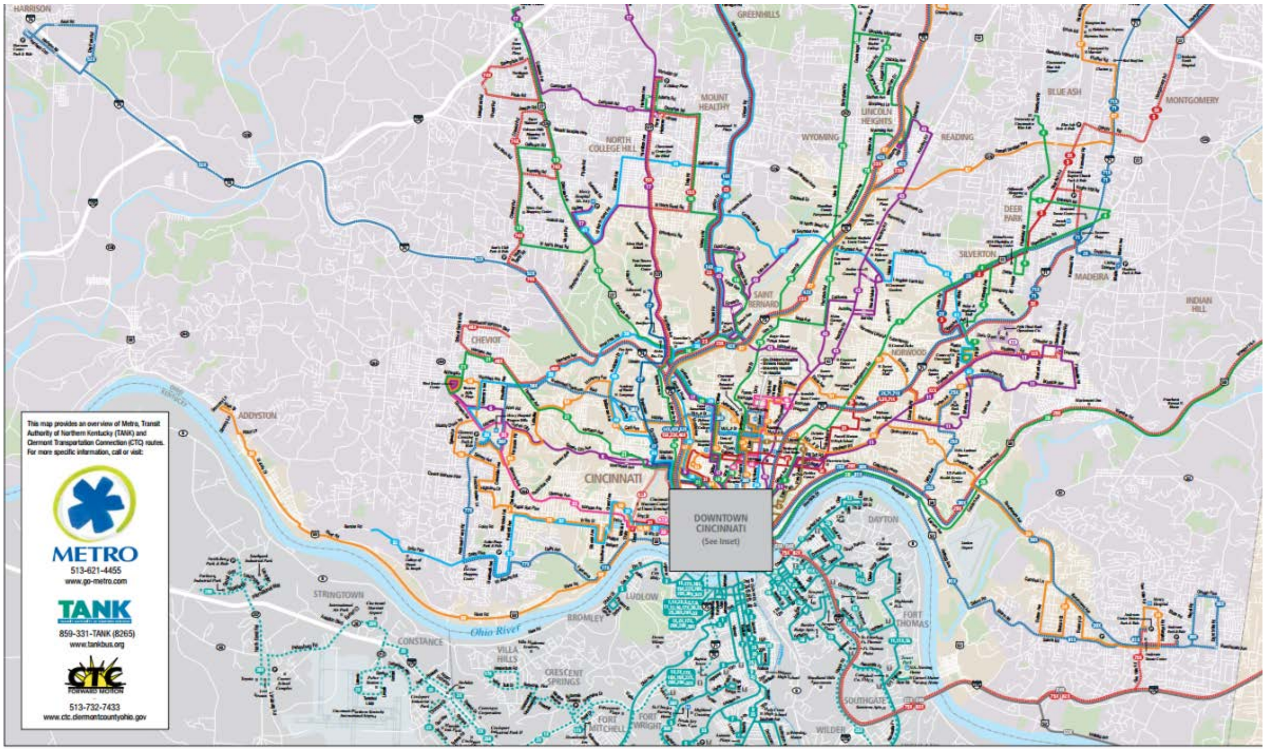
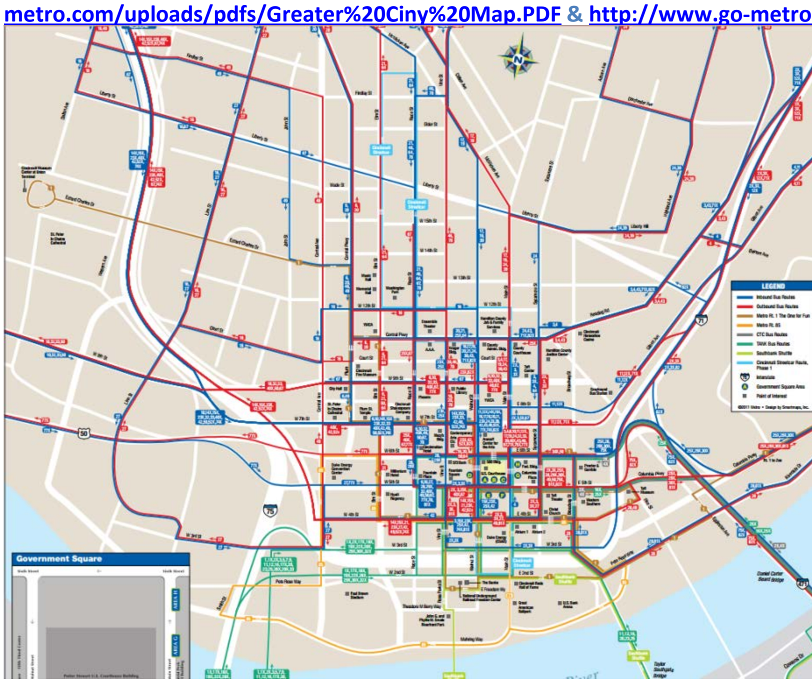


Figure 4: Greater Cincinnati and downtown routes respectively. http://www.go-metro.com/uploads/pdfs/Greater%20Ciny%20Map.PDF & http://www.go-metro.com/uploads/pdfs/Downtown%20Map.PDF



Bike Share at UC

Bike share is a program run by the University. It is part of the UC Bike Plan which is a document put out in 2009 outlining recommendations and planning points for how to improve biking experience and accessibility on and around campus. Through Bike Share anyone with a valid University of Cincinnati Student ID to rent out a bike for a day much like a library book for no cost. This is done through locations on the Universities' Uptown Campuses, which includes the Campus Rec Center and the Fitness Center at the CARE/Crawley, with possibilities of expanding to other areas on campus. It is part of UC's sustainability plan and seen as a way to improve student health, as well as decreasing the universities carbon footprint replacing motor vehicles as a mode of transport.

Dialogue with Stakeholders

A great deal of information was gleaned by conversations with our stakeholders over the phone. Both Jack Martin and Kay Weaks were interviewed on Friday, November 2. Talks with Jack revealed the effectiveness of a residential permit program and what potential impacts price control could have on parking utilization. He also encouraged us to view the problem as one with multiple facets, because that's exactly what it is. There is not one simple solution that will fix everything without some radical change, and he expressed that to us. Every community has its own unique needs, with Corryville serving as a prime example with its parking codes. He also redirected our thought process because we had originally thought that people were having trouble parking at their destinations, but Jack pointed out that this wasn't really the issue as it had more to do with where people were parking when they returned from these destinations. Jack also reinforced a thought we already had, which was the idea of incorporating Zipcars with apartment complexes.

The conversation with Kay proved to be equally fruitful. She provided us with a lot of insight as to what measures are currently being considered to alleviate the demand for the limited parking spaces in Corryville. She also reiterated the different needs of the neighborhoods around campus by suggesting that Corryville have its own set of codes for the construction of new parking spaces on personal property being that the current codes don't suit the style of homes that are present in the area. Kay also revealed that parking violations are usually only cited on a complaint basis. This is not suitable for stopping the improper practices of residents if they can get away with things most of the time. Coincidentally, Kay also mentioned that Zipcars were a good idea to implement in greater numbers. She also gave us several people that we could contact to inquire about garage space. We later contacted a few of the garages to get a feel for what kind of space is available if we really were to implement a long-term parking option aimed at students. We were able to confirm that the spaces are available in locations like the Hampton Inn near campus and Town Center Garage downtown, where the number of excess spaces would be able to accommodate at least a large portion of the long-term parking or park n' ride programs proposed later in Chapter 5. By confirming the availability of space, our proposal is shown to be more realistic.

Info from UC Police Dept. and Cincinnati PD

The University of Cincinnati Police Department and the Cincinnati Police Department were rather difficult. These sources were used for information on parking rules, regulations, and statistics. Before contact with the actual police department, their website was used to research laws in the area. Two that seemed pertinent to our challenge were laws titled, “Parking Unreasonable Time” and “Residential Parking Permits Criteria.” The first outlined rules about how long a person is allowed to park legally curbside in a residential area, which was 14 hours at a time before a ticket was warranted. The latter was criteria for getting an area approved as a residential permit area, which are as follow: (a) Be zoned residential and used exclusively for residential purposes., (b) Have more registered vehicles or residences than there are available on-street parking spaces., (c) Have the total number of spaces actually occupied by vehicles exceed 75 percent of the number of spaces available for parking during two typical 8-hour periods, excluding weekends, as disclosed by an engineering study, (d) Be large enough to discourage non-residents from parking in adjacent non-permit areas, (e) Have mass transit service available within at least two city blocks. (f) Have available for the general public either off street or meter parking. Talking to the police it is apparent that the first set of rules for unreasonable time of parking were enforced by complaint basis only and when said complaint was answered, tires were marked and another 14 hours would pass before a ticket was actually given out depending on the discretion of the officer on duty. While contacting the University Police Department some statistics were also given on tickets given out in the last fiscal year: 10626 tickets on campus with 1194 of these being repeat offenders.

University of Cincinnati- General Stats

We found that over 40,000 students attend the University of Cincinnati and her other campuses (UC.edu/parking), with a large majority, at least 20,000, at the Main Campus every day. The university itself can house only 4,000 students (uc.edu/housing). According to some thin-slicing calculations, at least thousands of students and faculty bring a car near the university regularly, and do not park it in UC’s on-campus garages. This leaves them to parking on the street, either at one of the few meters bordering the university, in a garage off-campus, or in residential areas for free.

Parking Solutions in Existence

We perused a multitude of articles, as well as case studies, that looked at parking solutions already in existence. By looking at these solutions, we had at least an idea about how various types of solution function, and where they are appropriate. The case studies are not those used for our final proposal, but merely acted as a point of research from which to start.

We used the article by Aubrey Roff, “Campus parking problems plague colleges nationwide” to become familiar with the problem. Her article echoed all that we had been told by our stakeholders, and assured us that this was not a problem that was unique to Cincinnati. The article speaks of how a lot of factors form the problem. Expensive garages priced by the university, shortages of garage space, and the parking that nearby streets provide all play into the parking problem. This means that our solution to this problem would also have to address several factors.

We performed additional research to understand modern parking controls, like parking meters and residential permit programs. It was found that parking meters are an effective solution to parking congestion, often implemented in retail and downtown districts, to increase parking turnover (US Dept. of Transportation). Our problem is in a residential area, and it would not be unheard of to place meters in a residential area, or even on a campus (Digital Payment Technologies, 1).By charging the user an hourly rate, one can cause the user to stay for a shortened amount of time. The higher the rate, the shorter the amount of time stayed .If the user absolutely must park in a certain location, prices can be augmented at the user's expense. But, it was often found that planners aim for a street utilization percentage of around 85%. By adjusting the price, even minutely, one can slightly alter the percent utilization of the street so it is optimum. This, however, can be upsetting to users. When the price of metered parking in downtown Cincinnati was increased to two dollars per hour, many were angry (Opinionati). This change was for the best, though, as it increased city revenue, and acted to cut down on over-utilization of the parking available downtown. Traditional meter systems involve a single meter, where one meter covers one space, and the meter only takes coins. However, technology has greatly expanded in this field, providing a variety of options.

Figure 5: Image of motorist interacting with new meters in Cincinnati. Image by "City of Cincinnati Parking" http://www.cincinnati-oh.gov/parking/news/new-card-coin-meters/

Many meters now allow payment by credit card. Even in Cincinnati, 1,400 meters were installed that now allow payment by credit, debit, and coin (City of Cincinnati Parking). This method of payment encourages user payment, by making the purchase of time easy. Motorists are much more inclined to swipe a card than carry around loose change and feed that to the meter. Payment can be made in other forms, as well.

With some meters, one can now pay by their cell phone. By registering their phone and car with the parking meters in the area, one can simply purchase their time from a meter all from the seat of their car. License plates can be scanned to see if that person has paid for their spot by phone, or if they need a ticket. Another option still is the In-Car Meter. One must purchase a small, authorized device that goes in their vehicle. One prepays to put time on this device, and the time runs down whenever the vehicle is parked. This solution prevents the need for meters altogether, but has its flaws (The Expired Meter). In Chicago, there was an In-Car device called "ParkMagic." This device performed well, and received great feedback from users. The program also incorporated a pay-by-phone option. But, after about three years, the program's trial period expired, and the city elected to not maintain it. Reasons for this are likely financial. The amount of money needed to maintain parking meters was probably being diminished by the innovative in-car meter devices. This does not mean that the in-car meters are not an applicable solution in other cases, though.

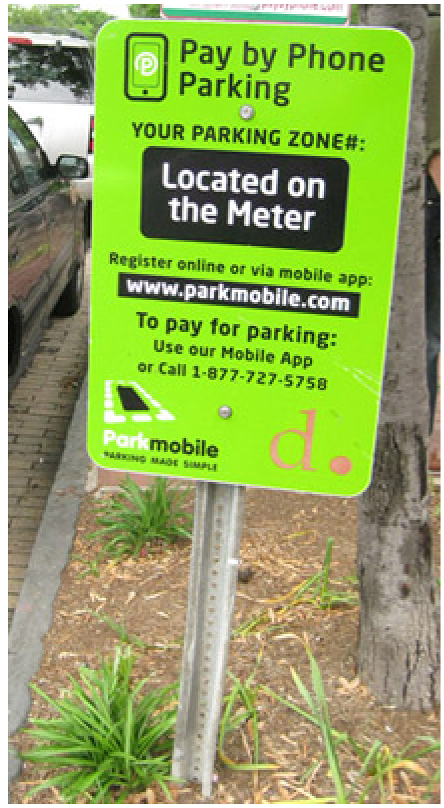


Figure 6: Sign indicating a pay-by-phone option in Washington DC. Image from US Dept. of Transportation http://ops.fhwa.dot.gov/publications/fhwahop12026/sec_7.htm

Multi-space meters are another somewhat recent innovation to the traditional parking meter. They are very similar to the normal single-space meter, except that they can manage several spots, up to an entire block-face at once (Heffron Transportation Inc). There are two main types of meters. Meters termed "pay-and-display" require a multi-step process for proper use. First the motorist must park. Then he or she must walk to the multi-space meter, pay, and obtain a receipt. Then, the motorist returns to their vehicle to display their receipt. This type of system allows for the street to be efficiently utilized, because motorists can park anywhere their car will fit. They pay for time on that block, not time in a specific place. The other type of multi-space meters, "pay-by-space" meters, use a different method of managing vehicles. These meters are used on streets with pre-marked spaces for cars to go, leaving motorists no freedom in how closely they park next to other vehicles. However, this meter does not require that one returns to their vehicle after payment, as one pays the meter for their numbered parking space specifically. Both types of multi-space meters have their advantages and disadvantages, and both types lend themselves well to certain situations. Though both types of meter come at a greater cost than the traditional meter, fewer multi-space meters are necessary to manage an area than with single-space meters. Multi-space meters ultimately free up crowded sidewalk space. They can take the job of up to an entire block's meters, and that makes a block more travelable, and aesthetically pleasing. The meters have been designed to take credit cards, cash, and coin, and provide an excellent alternative to traditional single-space meters (Heffron Transportation Inc.). They also provide the ability to store and communicate information about how people are parking that single-space meters could never achieve. In Washington DC, the multi-space meters can track how much parking is sold at a certain time. They can track how long each car was parked. They can follow trends that appear as data is gathered over weeks at a time. This data can be quickly communicated to those operating the meters, so that prices can be dynamically adjusted to create optimum street utilization (Perkins, 1). Figure 7 below shows sample data of parking trends. By looking at parking trends and using this information to better street parking utilization rates, the beginning capabilities of a multi-space meter system are shown.

Residential Parking Permit programs are another parking control that we investigated. This type of control is utilized in residential areas across the country, and is proven to decrease the utilization of street parking. The idea is this; the city sells a number of permits to residents of the community. The permits are usually inexpensive, and allow the permit holder to park on their street. Theoretically, there should be at least on parking space on the street for each permit holder. Spaces are reserved, typically, during daylight hours, weekdays. Many areas make the permits easy to attain, allowing many permits to be purchased, and the streets only become congested with a superfluous amount of permit holders (US Dept. of Transportation).

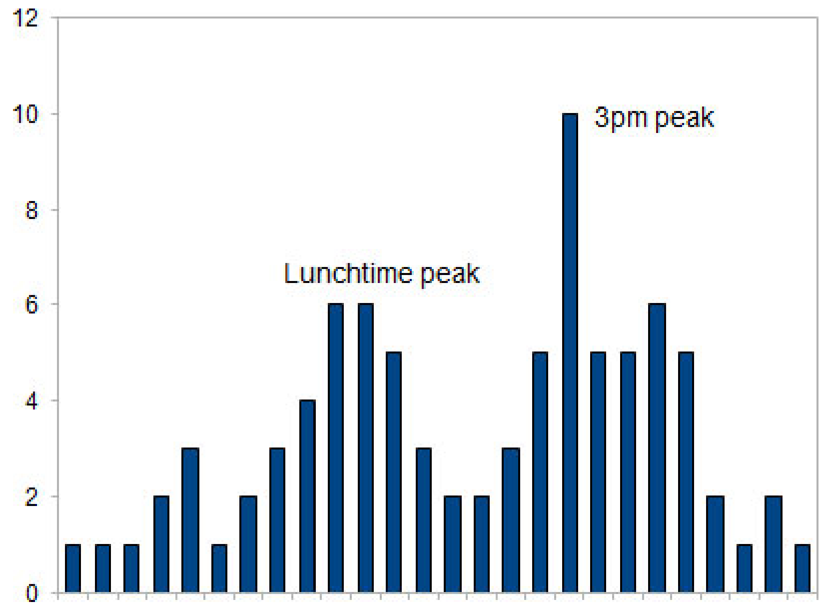


Figure 7: Example of data gathered from a multi-space meter. Shows how many cars are parking with the meter throughout the day. http://greatergreaterwashington.org/post/2422/multispace-meters-make-performance-parking-easier/

License Plate Recognition technology is another new system we investigated. While this technology is new, it has been shown to be effective from multiple sources, including the T2Systems (referenced later in this section) case studies and the US. Department of Transportation's research. The license plate readers are essentially camera's that can detect when a license plate is in view. They can read the characters on the license plate and store this information. The system can be integrated with a database to automatically pull up information on the vehicles whose license plates are scanned. The advantages of this technology are various. Washington DC used the technology to track parking habits, and also those with outstanding parking violations.

Digital tracking seems to be the way that many cities and universities are heading. T2Systems is a corporation that specializes in bettering the parking systems at major universities across the country. We used their case studies as research points, and not as final case studies with which to compare our final solutions. From their case study about IUPUI in Indianapolis and the University of Houston, we saw the advantages of storing and delivering tickets digitally. When this is done, all of the information about violators is stored in a database, and can be recalled immediately. Less tickets are forgotten or lost, and the user can then even pay the ticket online. This increases revenue for the city. It also deters violators, because the police can better track who has outstanding tickets, and make sure they are paid. T2Systems dealt mostly with on-campus car storage issues. This we deemed to be in the hands of UC's parking staff, and we thought it would be advantageous to avoid entanglement in that area. We focused mostly on off-campus solutions, and therefore T2Systems' helpfulness was limited.

New Developments

There are several recent developments in the area surrounding UC, and subsequently near Corryville. There exist plans for many more developments, as well. We looked specifically at Views on Vine, Euclid Square Apartments, Vine St. Flats, Campus Park Apartments, The retail on Calhoun Street, University Edge, Morgens Hall, and USquare at the Loop. We decided to find how many spaces these developments should provide for the cars that they will attract, and also how many parking spaces that they are providing. By applying the formula that one parking space is needed per unit, 4 spaces for every 1,000 sqft of retail, and 2.5 spaces for every 1,000 sqft of office space, the anticipated parking need was calculated to be around 2,800 spaces. The parking provided by all of these developments was calculated to be between 1,200 spaces and 1,900 spaces, which still leaves a probable deficit of over 1,000 parking spaces. This means that about 1,000 cars will be brought into the area regularly, with no pre-allocated place to park. These cars will almost definitely turn to free street parking, which will only compound the parking congestion in the area. Data specific to each development can be found in the Appendix.

Figure 8: Euclid Square is a new apartment complex being built in the area, which will add to the number of cars in Corryville
http://www.corryville.org/index.php?option=com_content&view=article&id=92&Itemid=173

Chapter 3: Conjecture

A conjecture was created in mid-November of 2012 to present to our stakeholders, Kay Weaks, Jack Martin, Weston Munzel, and Nathan Wessel. The pathway we took to reach our conjecture is detailed in the diagram below.

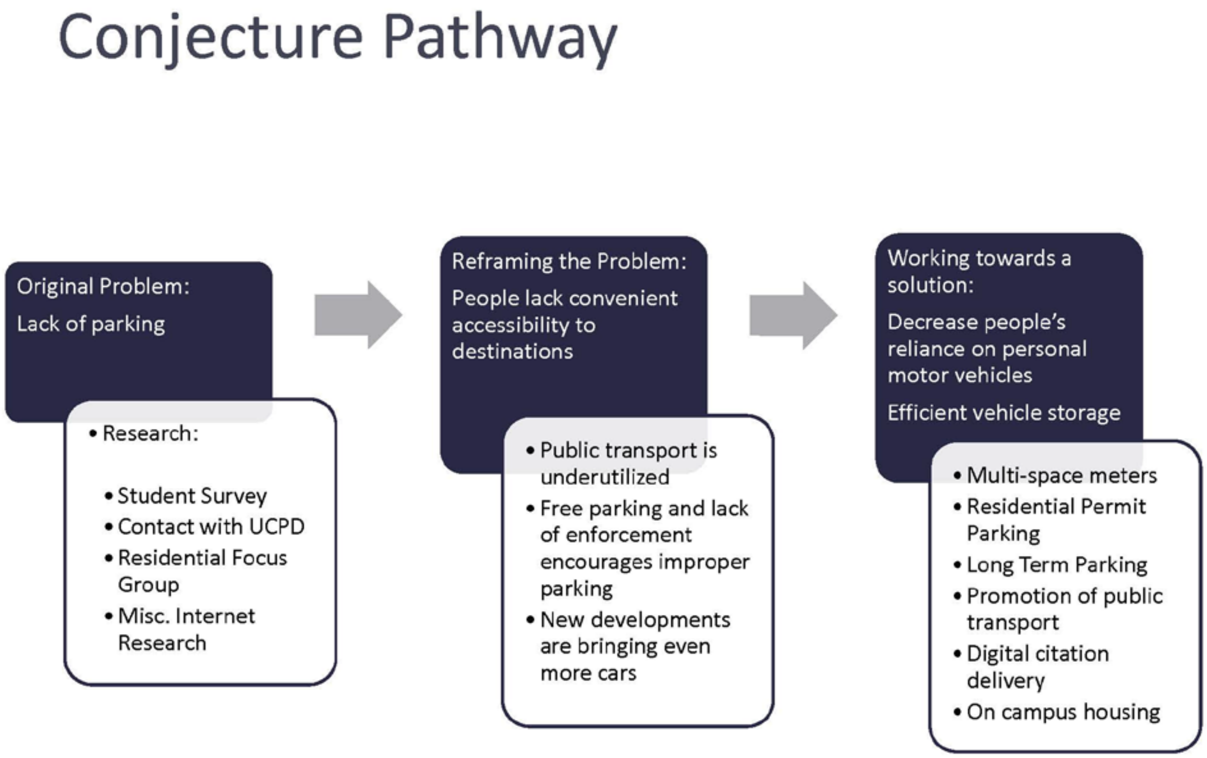


Figure 9: Conjecture Pathway, presented to stakeholders on November 6 2012

Original Problem

This diagram shows that our project began when Nathan Wessel, Jack Martin, and Kay Weaks presented to us the "parking problem." Initially, it was just that: a parking problem. The residential streets of Corryville were called "crowded." It was communicated that people were parking in undesirable ways because they could not find a place to park on the street near their place of residence. Some cars are parked on lawns. Others are parked too far from the curb, or blocking a sidewalk. Others, still, are sitting in the streets for months on end, unused and likely dysfunctional. Nathan informed us that this crowded street parking is likely not due to a deficit of parking spaces. For every one car in the area, there are three potential parking spaces. It is just that many spaces go largely unused, while others are in extremely high demand, like the parking spaces present in the streets of Corryville. With this information in mind, our team began research. The student survey, the UC Police Department, conversations with stakeholders, and of course the multitude of information gathered on the internet, were all used to better understand the problem we were to solve.

Reframing the Challenge

We reframed the question, so to speak, by looking at what our stakeholders told us, and trying to look at their challenge in a different way. We tried to create a challenge that prompted innovative solutions to problems that can be solved. And so, the challenge was not to make more parking spaces, but it was to increase convenient accessibility to destinations around UC, with a particular emphasis on the residential areas of Corryville. Accessibility, we found, is hindered by several factors. Public transportation is widely underutilized, especially by the student population. Instead of taking a bus, many students choose to bring their cars and park them in front of their residence in Corryville. This hurts everyone's accessibility to their destination. Those truly in need of a parking space near their home may be denied one. Additionally, those parking in Corryville have a lot of freedom in how appropriately and legally they park. Enforcement of the law is in some cases on a complaint-only basis. For example, technically, no vehicle should be in the same space for 14 consecutive hours, yet the police will do nothing about this unless a complaint is filed. This encourages students and long term residents to own cars and park them in the streets of Corryville, even if they do not use their vehicle often. Other parking violations are often overlooked, which creates a dangerous parking and driving situation for all present motorists. We also found that new developments are only bringing more cars to the area, and not enough parking is being built to accommodate the increased traffic. This will only hurt people's ability to reach their destinations conveniently and quickly.

Potential Solutions

In order to combat the various problems concerning increased accessibility, we developed some tentative solutions. Since these solutions were relatively unrefined, we had many disconnected ideas that we were considering. We were considering multi-space meters. We knew that they were in use at the Ohio State University, and that they could act as an effective alternative to traditional single-space meters. At this point in our research, though, we did not realize their full potential.

We also considered a Residential Permit Parking Program. This solution again existed separately from the other solutions, and was not tied into any other solutions. We suggested that implementing a Residential Permit Parking program on some or all of the residential streets of Corryville would help fix the parking congestion there, and thus it would enhance accessibility to destinations. From research shown in Chapter 2 of this report, we knew how this kind of program worked, and its various advantages. From the case study, *Parking Spaces/Community Places* by the Development, Community, and Environment Division of the U.S. Environmental Protection Agency, we found that the program is by no means perfect. It is stated in the study that "In many urban areas with limited off-street parking, curb parking is reserved for residents through residential parking permit programs. In most cases these programs give residents free or very inexpensive curb parking permits and prohibit anyone else from parking there. However, this [RPP] can leave many spaces unused during the day when nearby businesses could use the extra parking" (EPA, 32). While RPP programs do assure that permit-holders have a parking spot near their residence when they need one, oftentimes non-permit holders are denied open spaces created when permit-holders are using their vehicle. The non-permit holders are forced to look elsewhere for parking, decreasing convenient accessibility to their destination. An additional case study, *An Exploratory Study of Parking in a Lexington Neighborhood* by Ed McCarthy, gave similar insight. This study focused on residential areas in Lexington, Kentucky who had implemented an RPP program in certain areas of residential neighborhoods. The results of the program were unfavorable. Those areas with RPP had low percent utilization of their street parking. Those areas without RPP showed an increase in percent utilization; those denied access to the permit zones simply parked a few blocks away in a non-RPP space, crowding non-RPP zones. This study shows that if an RPP program is implemented, it must be done so strategically, as to maintain an even distribution of vehicles. This even distribution is difficult to achieve, since permit-holders often use their cars and leave their spaces empty, while non-permit holders' parking options are limited to the already crowded non-RPP areas.

Our team also suggested that promotion of public transportation. Our research indicated that many forms of public transportation are underutilized. The Bike Share program at UC, the UC shuttle, the Metro bus line, and car-sharing are all viable options for students and residents of Corryville for transportation. Many people with cars, if they were to use these public forms of transportation, would have accessibility to their destinations without the use of the car. These alternative forms of transportation, by eliminating the need for a personal vehicle in some cases, can enhance accessibility to destinations in two ways. One, people are getting around quickly, inexpensively, and easily with public transportation. Secondly, the need for personal vehicles is lessened. This means that fewer vehicles will be present in the area, where they contribute to congestion. This congestion hinders others' accessibility to their destinations. For forms of public transportation, we focused on the Metro and Zipcars. To promote the Metro, we proposed re-instating free bus pass that every UC student received. We felt that this was a good way of increasing ridership and lowering the number of personal vehicles in the area. We also looked into two case studies about car-sharing. The prominent car-sharing program in Cincinnati is called "Zipcar." The same EPA study *Parking Spaces/Community Places* and the study *On Street Parking Spaces for Shared Cars* by Andrea Osgood were both used to better understand how car-sharing programs work, and how successful they can be. In the study by Osgood, there are two very promising facts. She states, "Each shared vehicle removed 9 to 13 other vehicles from the road. Fewer vehicles can lead to significant reductions in traffic congestion … and parking infrastructure" (Osgood, 11). This means that even a small number of Zipcars, in addition to the current fleet of four

Figure 10: a Zipcar advertisement.
http://www.parking.wsu.edu/File/for_universities.jpg

that exists at UC, can drastically reduce the presence of personal vehicles. In addition, the study declares, “Evaluations have consistently shown that carsharing membership increases as more vehicles are added, and that members who previously owned one or more cars reduce their vehicle travel and/or sell a car” (Osgood, 11). This again means that if more Zipcars were present in the UC-Corryville area, there would likely be less personal vehicles, which, as previously stated, increases people’s accessibility to destinations. The EPA case study contained much less information about carsharing, but echoes Osgood’s study in that shared cars reduce the need for personal vehicles.

Another potential solution that we presented as a part of our conjecture was long-term parking. The idea behind long-term parking is that those who have a vehicle in the area, but do not use their vehicle often, can park their car in a parking garage or lot. This parking garage or lot can be somewhat distant from the places of residence of those who park there, because those who park there do not need their car often. By creating this satellite parking lot, many relatively unused cars can be taken off of the streets, clearing congestion. When vehicle owners do need their car, a shuttle can take them to the parking garage or lot. The vehicle owner’s accessibility to their car is slightly inconvenienced. But, the vehicle owner has many other options like public transportation if they need to reach a destination. And, ultimately, the residents and students in the area have increased accessibility due to the fact that streets are less congested with personal vehicles.

Yet another idea we presented to our stakeholders was altering the rules on where UC students can live, and if they can have a car. Many universities, including UC, mandate that freshmen live on campus. However, UC is allowing many more cars to come to the area by allowing freshmen to have personal vehicles. Many universities do not allow this because of the congestion it would bring. If UC declared that freshmen could no longer bring personal vehicles, this would reduce the number of cars in the area, and it would help reduce the congestion on residential streets. We also considered mandating more on-campus living for students. If freshmen and sophomores had to live on campus, and both groups of students were denied bringing a personal vehicle, there would be considerably less vehicles in the area. However, UC does not appear to be able to accommodate that many on-campus students, due to a limited housing capacity on the campus.

Figure 11: Downtown Houston, aided by T2Systems digital citation delivery. http://www.t2systems.com/customer-successes/parking-software-case-studies.aspx

Our last potential solution was to bring parking enforcement into the digital age. A company called T2Systems solves parking problems on college campuses and in crowded metropolitan areas. Two of their case studies, one looking at downtown Houston, and the other at Indiana University Purdue University Incorporated (IUPUI) both showed the advantages of going digital. Parking enforcement officers were equipped with handheld devices that can take pictures of parking violations, file the violation digitally, and then upload the citation to a database. By doing so, all parking violations are tracked more accurately than with a paper system. This better tracking leads to more paid citations, and thus a greater incentive to not park illegally. If officers in and around Corryville were equipped with such handheld devices, enforcement of the laws would be increased, and people would be discouraged from parking illegally in the future. With less illegal parking jobs, the neighborhood would be safer, enhancing accessibility to destinations in the neighborhood.

Post-Presentation

After our presentation, we received feedback from Jack Martin, Kay Weaks, and Weston Munzel, our stakeholders. They had the following suggestions.

They said that the Metro was updating some routes. These routes might lend themselves to the long-term parking option, if a major parking garage or lot is near the route. They said the same thing about the UC Shuttle service. Does the shuttle already go by a garage that would lend itself well to the long-term parking option? They, and Francis Russell, also encouraged us to find a rough number of how many cars new developments in the area are bringing, and how many parking spaces these new developments are providing. If there is a deficit, then the accessibility problem will only be worsened, which is important to know.

They liked the idea of an RPP program. Jack Martin said it would “level the playing field,” by eliminating free parking. Once free parking is gone, motorists must choose between parking on the street for a fee or parking in a garage for a fee. Most people will end up using the garage if the fees are comparable, because garages are safer for personal vehicle storage. This is good, because many local garages are well under capacity. By moving cars from the street into garages, vehicles are stored more efficiently and accessibility is enhanced. They also encouraged the idea that cars must be registered in the city of Cincinnati in order to acquire a permit. This would cut down on the number of permits sold, as to avoid over-selling permits.

They also were interested in the idea of parking meters. They suggested we really focus on the meters having variable pricing, so that percent utilization of street parking can be closely controlled so it is optimum.

We discussed the idea of giving every UC student a Metro pass. The cost of this pass would be included in student fees. They found this idea promising, saying it would create a generation of future riders who would feel comfortable riding a bus, instead of relying on a personal vehicle.

We discussed to possibility of growth in the RideShare program at UC for commuters, but no party was extremely enthusiastic about this idea. RideShare is program that matches students who commute and live near each other so they can commute in one vehicle. However, as many college schedules differ widely, this program is not reasonable for many students.

The last major suggestion they gave to us was an idea we had already considered, which was validating. They suggested that with the long term parking, parkers are charged less if they use their car less. This incentivizes lesser personal vehicle use, which can ultimately lead to decreased dependence and desire for a personal vehicle.

After their feedback, we went back and continued researching and brainstorming for solutions. We then refined the solutions we thought were promising. Soon, we had several ideas we really liked, and they were approved by Jack Martin. These solutions are discussed in Chapter 5.

Chapter 4: Case Study Research

In order to further develop our solutions, as well as validate our proposal, several case studies were investigated. The several case studies are incorporated into our major solutions.

Residential Permit Parking

Residential Permit Parking, or RPP, seems a viable solution for enhancing everyone's accessibility to their destination. The goal of RPP is to reduce the number of cars parked on the street, by allowing only permit-holders to park on the street. An RPP program currently exists in Seattle, Washington. A case study there, *Seattle Parking Management Study*, states that "it [RPP] is appropriate where parking congestion in residential areas is being caused by a nearby business or institution such as a hospital or school" (Heffron Transportation Inc., 33). This means that a similar program may be useful in controlling the congestion in Corryville, since Corryville's street parking is used by both UC students and faculty.

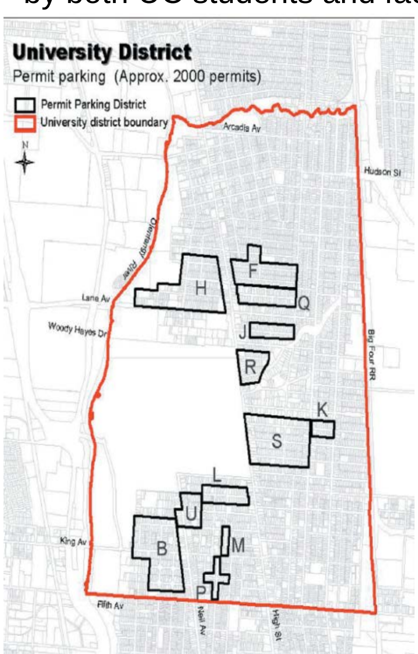


Figure 12: Permit Zones at OSU. Taken from *Parking [at OSU]*

A case study about the Ohio State University, *Parking [at OSU]* also lent an interesting view on RPP programs. At OSU, there are several "zones," areas of a few to several blocks, that are deemed "permit" areas. This means that in order to park there, one must own a permit for his or her vehicle. This solution would be effective at reducing the congested street parking at OSU, if the number of permits sold was not so high. Permits at OSU are easy to attain, and relatively cheap, so a large majority of students who need parking in a certain zone will buy the permit. This has not alleviated the problem, but only caused congestion by permitted parkers instead of non-permitted parkers (*Parking [at OSU]*).

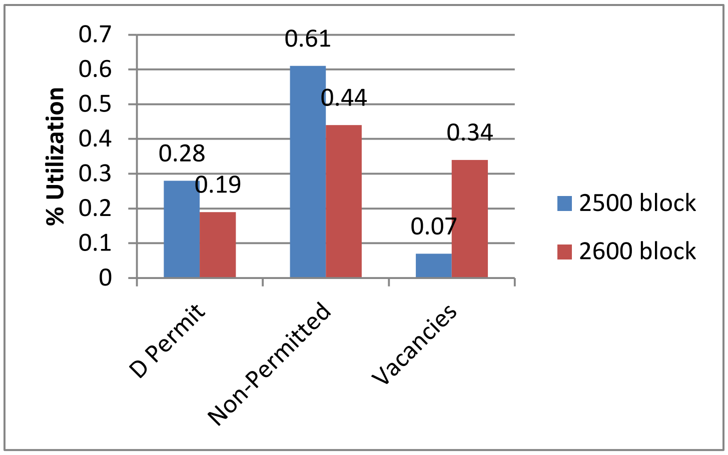


Figure 13: Berkeley's % Utilization for Area D. Data taken from *RPP Case Study for Area D*

An additional case study performed in Berkeley, California, offered a solution to this high distribution of permits. *RPP Case Study for Area D*, showed that the number of permits sold can be limited without just setting a cap on the number of permits available. The city of Berkeley limited permits sold by requiring that one have their car registered with the city of Berkeley in order to obtain a permit. In essence, this deterred many from purchasing the permit, and instead they found another place to put their car. This successfully lowered the percent utilization of street parking, even near UC Berkeley. One can see in Figure 4 that the area with a permit had much lower congestion than the area without a permit. Other relevant information includes the fact that the 2500 block was closer to UC Berkeley's campus, and that it had greater congestion due to this fact. These two blocks, the 2500 and 2600 block, were under control due to the permit program, though at times there were more permits in distribution than actual spaces on the street. Just requiring that the vehicle was registered in the city of Berkeley was not sufficient to prevent over-distribution of permits. Another control on who can purchase a permit may be necessary for the Corryville area. Regardless, this situation very closely resembles that of Corryville and the University of Cincinnati. An RPP program for Corryville would prevent commuters from parking on the streets and contributing to the congestion that exists there. For this reason, an RPP program where there is a limit on number of permits sold seems a feasible option to enhancing accessibility to destinations around campus With less cars in the street, more parking is available for those who need it most. Those without cars may then utilize other forms of transportation.

Multi-Space Meters

Multi-Space Meters also seem to be a possible solution to the accessibility problems around the University of Cincinnati. Basically, a multi-space meter is like a normal parking meter, except that it manages several spots at once. We focused specifically on the "pay-and-display" type of meter, where one first must park his or her vehicle. They then walk to the multi-space meter, pay, obtain a receipt, and then display this receipt in their windshield. This technology is relatively new, though widely implemented. A case study performed by Heffron Transportation Inc., *Seattle Parking Management Study*, states, "One pay station is used to provide coverage for an entire block face" (19). This allows an entire area to have metered parking, increasing parking turnover, without the ungainly presence of a multitude of single-space meters. Multi-space meters do come in two varieties, as mentioned in

Figure 14: An example of a Pay-and-Display meter. Image by Dwight Burdette. http://upload.wikimedia.org/wikipedia/commons/0/0a/Multi-space_parking_meter.JPG

Chapter 2 of this report. Both “Pay-and-display” meters and “Pay-by-space” meters have their distinct advantages and disadvantages. The former requires that motorists park in any available, achievable space on the street, walk to the meter, pay the meter for time on the street, obtain a receipt, and then display that receipt in their windshield. This may seem like a tedious way to park, but it maximizes the number of cars that can fit on the street by allowing small cars to take up a small space, and for all cars to park closely to one another. The latter, pay-by-space meters, only require that motorists park in a specific, pre-marked space on the street, and then pay the meter for that spot. This system more closely mirrors traditional single-space meters in their ease of use, but fails to optimize available space on the street as pay-and-display meters do. These pay-and-display meters, due to their efficiency, were the focus of our research into this case study. The following quote from the Heffron case study on Seattle sums up the effects of these meters on motorists: “The public response to the pay-and-display units has been very positive. The increased reliability of the pay stations (in comparison to the old mechanical meters) has bolstered public confidence in the system. Customers like having a receipt for their parking expense, and they love the ability to pay with a credit card. Communities have appreciated the aesthetic impact on the streetscape. The only complaint the City occasionally hears relates to walking from the vehicle to the pay station” (21). In addition to this positive feedback, the meters can bring the city other advantages. After implementation of pay-and-display meters in Toronto, Canada, the city saw an increase in parking revenue of between 30 and 40 percent (Heffron, 21). This is likely due to the fact that the meters accept credit cards. Motorists are inclined to spend more at the meter when paying does not involve feeding the meter coin after coin.

The pay-and-display multi-space meter’s viability is only strengthened by its ability to communicate. These meters can tell a central control when they are full of coins, or when maintenance is required. In addition, they could relay information about the utilization of street parking amongst other things. These potential extended capabilities are discussed in Chapter 5.

Park n’ Ride

The case study, *The Green Line Park-n-Ride: A Community Transportation Collaborative*, by Linda Petee was referenced for knowledge of a functional system. Park n’ Rides, as they are often called, are essentially a way to cut down on commuter traffic. Many people who are going to the same destination park their cars in a predetermined location, and then all take a shuttle or bus to their final destination. This system works very well for the community near Delta College in Michigan. A free shuttle runs between a Meijer parking lot, whose extra spaces are used for the Park n’ Ride program, and two campuses: Delta College and Saginaw Valley State University. The program has been successful in gaining ridership, and has shown that this type of program can cut down on the amount of personal vehicles being brought to a college campus. Of course, with less commuter vehicles, the stress on parking at these college campuses was alleviated. Interestingly, this

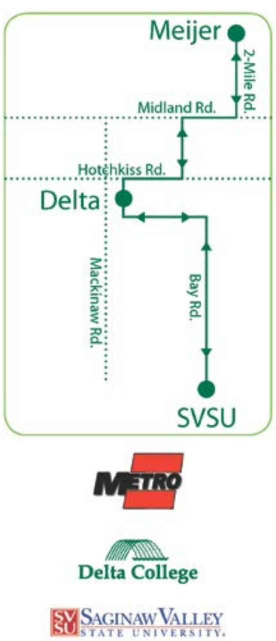


Figure 15: Shuttle route for the program http://www.aashe.org/resources/case-studies/green-line-park-n-ride-community-transportation-collaborative

study also looked at the effects of motivating students to use the shuttle. A raffle was created, and shuttle-riders' names were entered. Through the creation of a potential prize for using the shuttle service, the Park n' Ride program was incentivized, leading to more active users. With more active users, even less people bring their personal cars to either campus. The idea of incentivizing this type of service is very important. Many potential users will avoid this type of program simply because it is unfamiliar, and a personal vehicle is what is familiar. By creating a desire to use this type of service, one could prevent a multitude of personal vehicles from being brought to a campus area. We hold that these same principles apply to UC and residential Corryville. If a successful Park n' Ride program were created, many commuter vehicles would be in a parking lot or garage away from campus and Corryville, instead of cluttering residential streets.

All of these case studies show methods of reducing the amount of cars parking in the street. But, they provide more than just that. They show a way to enhancing everyone's accessibility to their destination. When the streets are less crowded, those who need a spot can find one. Those who are no longer parking their car on the street do not have to worry about finding a space. If they are parking in a garage, their spot is reserved. If they no longer have a car, they may utilize other forms of transportation that are more appropriate for their travel needs. In this way, accessibility to destinations is increased.

Chapter 5: Innovation Proposal

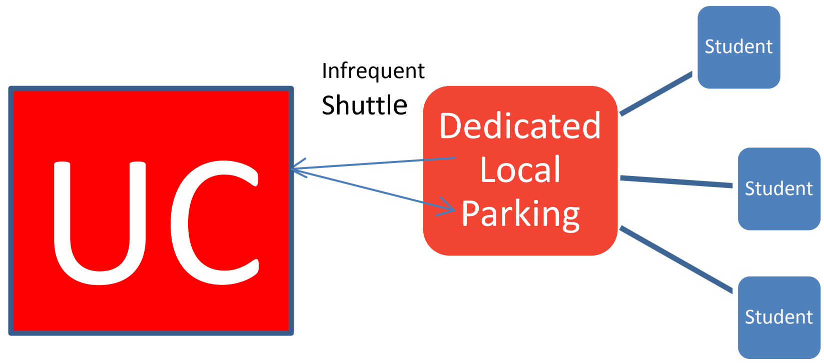
Our final proposal dealt with six major concepts/solutions that can be categorized into two distinct parts. The first goal was to rid the near campus neighborhoods of excess cars that were taking up free parking spots in residential areas. In order to rid the area of these cars, upstream solutions that prevented the need and desire for a car were found. The second goal was to turn better manage the vehicles present in these residential areas, while turning their need for space into a source of revenue for the city. The intention of these solutions is to enhance everyone's accessibility to their destination, whether this be offering a different form of transportation, or convenient storage of a vehicle.

Step One: Incentivizing other forms of accessibility for students

The initial step in our process deals with 4 independent solutions: Park-and-ride, long term parking, Zipcars, and the Metro. All of these attempt to get students to forego bringing a car to destinations nearby campus and potentially inconveniencing residents and visitors. They also promote the use of public transportation which is both cheaper overall for most students when compared to the upkeep of a car. These solutions can also benefit the city by revenue earned through use of public transportation.

Park-and-Ride

Figure 16: park n' ride logo from http://www.statefairshuttle.com/images/park-and-ride.png



Park-and-ride is a solution aimed towards students who commute to campus. The idea behind this would be to have a small parking lot or street away from residential areas next to campus where students could park their car and take a shuttle back and forth to campus. Frequent routes make using the Park-and-ride program convenient for the student, and use of the program would be incentivized. Taking from the case study, *The Green Line Park-n-Ride: A Community Transportation Collaborative,* ridership was increased because of the use of incentive. To motivate students to use the program, each rider would receive a punch card. Each time they ride the shuttle they would get closer to a reward, like a gift card at the UC bookstore. Students could use the program with almost no downsides after changing their daily routine. They would save money on gas, and be free of the hassle of finding a parking spot. And of course, this would free up dozens if not hundreds of parking spots at UC and the residential area of Corryville. The diagram on the right illustrates the flow of students from their homes (blue) to the parking storage, be it a parking lot, garage, or an empty street, to UC and the surrounding area.

Long Term Parking

Figure 17: http://www.flickr.com/photos/unocrisslibrary/5426387216/

Long term parking focuses more on students who are living very close to campus and have a car, but don't use it for more than long distance travel or moving (i.e. going home.) Students in this position will be able to park and leave their car in a selected parking lot, with some form of campus security, for a low rate that would allow it to compete with traditional campus garage passes. This solution is somewhat similar to the previous one, as it would require an underused or vacant parking lot that is far enough away from the campus to prevent overcrowding, yet close enough to allow for easy access. To get to the lot, students will use a shuttle that would either run on less frequent times, or on a pay-to-use basis (which could potentially be used in place of a one-time cost for a long term parking pass.) Some incentives we foresee being used with the program would be either lower prices for students who get their cars out less often, or coupons/vouchers to businesses that are near the parking lot or garage being given to those who use the service. If coupons are distributed, the person parking is happier with their experience, and the garage and local retail can benefit as well from the extra business.

Zipcars

Figure 18: Zipcar logo http://www.amymwilkinson.com/wp-content/uploads/2009/11/zipcar-logo.jpg

For the students who wish to have the convenience of a personal car without the cost of owning one, another part of our solution would be the heightened promotion and use of Zipcars. As there are already several of these cars in use on the campus, it should be relatively easy to acquire more for students. With enough promotion, students may find the competitive rates worthwhile for the utility of a personal car: a $25 fee per year and $7 per hour charge covers gas, insurance, and other costs that can lead to hundreds to thousands of dollars in savings for students. To add on to the cost incentives, every one Zipcar removes up to a dozen other cars off the road, freeing up many spaces in residential areas around campus and further increasing accessibility all around.

The Metro System

Figure 19: Metro logo http://local.cincinnati.com/hype/images/logos/logo64.jpg

The final answer to the first part of our solution is quite simple: the promotion and better integration of the already established Metro bus system. Getting students deals on bus passes, including the cost of a bus pass in the students' tuition, and/or allowing bus passes to be used in conjunction with bearcat cards that the students already have could very easily and quickly remove student's cars off the streets and get students using a cost-effective public transportation option.

Step Two: Managing Present Vehicles and Creating Revenue

Now that we have hopefully been able to get many students to use other options than the street parking in neighborhoods just off campus, we look towards better managing the street parking that is being occupied in the residential areas of Corryville and nearby. The two ideas we have for this part of our solution work hand in hand to make accessibility for motorists easier than ever and keep illegal parking and overcrowding of streets to a minimum. They also generate revenue for the city. With residential parking permits (RPP) and the "box", we can see a much more pleasant parking experience for the future of the neighborhoods involved.

Residential Parking Permits

Figure 20: a sample parking permit http://www.safetysign.com/images/catlog/product/large/Y5685.png

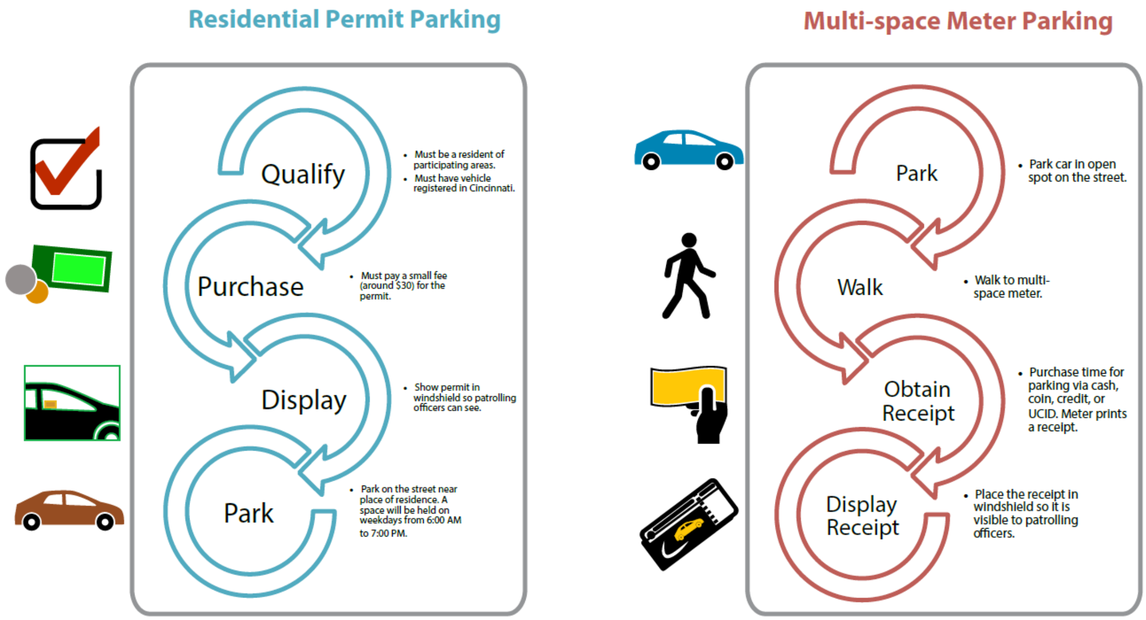
Our first solution, residential parking permits, would allow for long-term residents of the neighborhoods around the campus (and potentially farther away) with a reliable and cheap parking spot within a convenient distance from their home. These residents would have to register their cars with the city and be allotted a permit to display on their car that would allow them to park in their designated neighborhood for a small one-time fee paid annually. By mandating in-city registration as in the case study on Berkeley, California, the number of permits distributed can be limited. Residents opting for this permit would not be inconvenienced by the fees created by our second solution, so the overall cost should be very manageable especially when they consider the accessibility it will allow them.

The “Box”, Multi-Space Parking Meters

Figure 21: a sample multi-space parking meter http://4.bp.blogspot.com/-Yt--HK6GCCI/UATUu2yqiTI/AAAAAAAAHOI/EMSP5lUS4s4/s1600/IMG_0137.JPG

The second solution we have will work in tandem with the permits mentioned above. The “Box” a pay-and-display multi-space meter would be placed throughout residential areas, most likely on opposing corners of blocks. These meters could account for entire neighborhoods very easily as they would be networked together to form a comprehensive map of where people are parking and for how long. Dynamic pricing of parking is also an option, which could be used to direct people from overcrowded areas to less utilized spaces. People looking to use these spots can also use their smartphones to find where there is parking, pay for their parking, and let the boxes know when they plan on parking.

Synergy



(An illustrated walkthrough of how to park: RPP vs. Meter)

The synergy between these two solutions is also a huge bonus for residents in the area. Those using the permits from the first solution have their spaces saved for them by the boxes (the box will not sell a spot that it knows a permit-holder owns). But, if the permit-holder wishes, they can communicate to the box on their block, either by phone or through a menu interface on the box, when they will not need their parking space. When the box knows when a permit-holder will be out, it can sell that permit-holder's spot for the period of time that the permit-holder does not need it. The boxes can be programmed to keep a weekly schedule of when residents plan on using their parking spots and will be flexible with the amount of spots they give depending on this. This ability of the box to work with the RPP program prevents permit spots from sitting empty, and allows for efficient storage of vehicles. The following diagram depicts the relationship between the meters and RPP program.

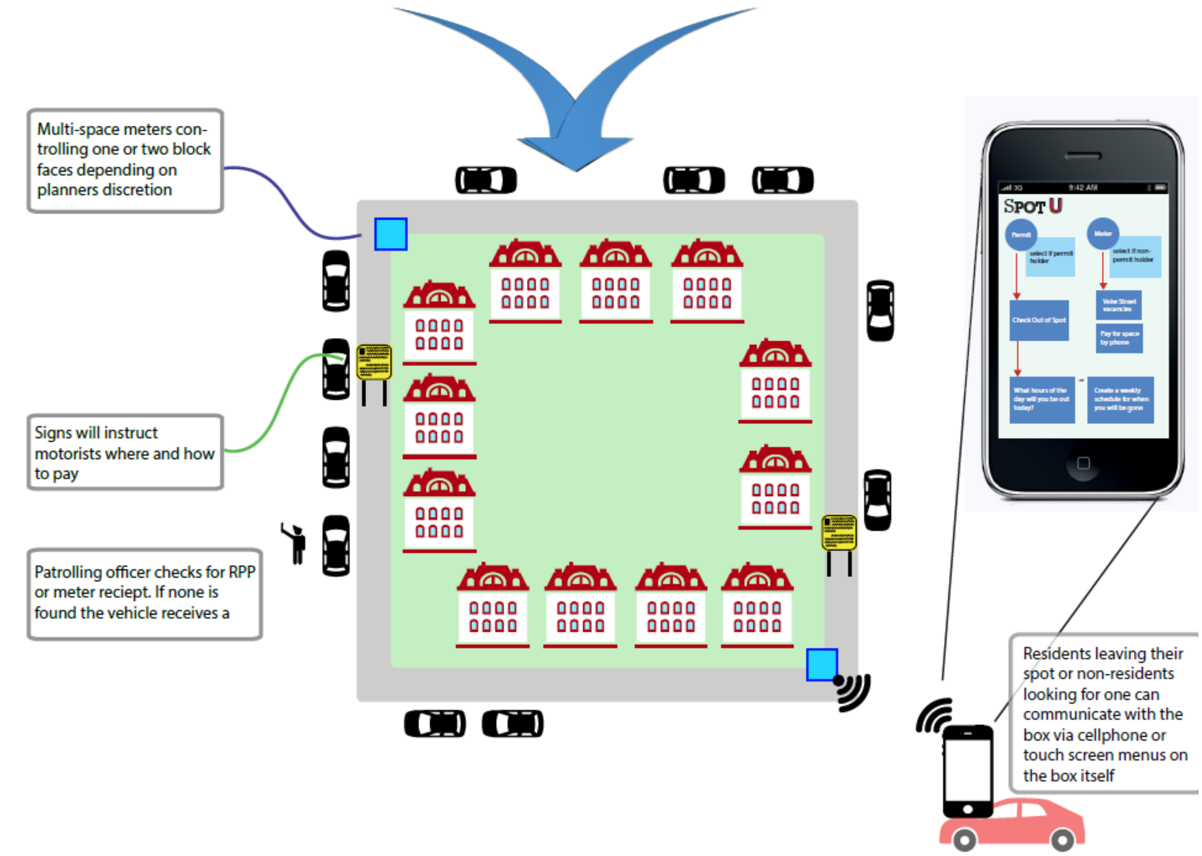


Figure 22: RPP-Meter relationship. How to Park

With this array of solutions in place we foresee a less congested residential Corryville and area around campus. We also see an increase in revenue for the city, with income from the RPP program, the multi-space meters, and increased public transportation usage. And, not all solutions are required for improvement to occur, which allows for flexibility in our solution, as any one of these could improve the parking problems we see around campus currently.

Chapter 6: Conclusion and Reflection

The search for a practical answer to the parking problem in Corryville carried out team through a journey of gathering information, generating ideas, and refining the ideas several times before arriving at a set of conjectures that practical in their application and reasonable enough to present to our stakeholders. Many of our early ideas, such as decreasing the radius from which the university allows first-year students to commute, were thrown out usually due to logistical reasons or the lack of a good plan for implementation. In this case, there simply isn't enough housing on campus at this time to support such a change. The tools used for gathering additional information included interviewing our stakeholders, creating a survey for fellow students, miscellaneous internet research, and calling other organizations affiliated with parking over the phone to ask some basic questions. This deluge of information allowed us to get a more accurate view of a problem which we only had a narrow scope on at the beginning of this challenge. This resulted in a truly fascinating change in our approach to tackling the issue, made apparent by the fact that we were batting around the idea of a simple application in our first meetings. A new understanding of human behavior had to be utilized in order to evaluate the merit of our ideas, though, and we quickly realized that people need a reason to act differently than they are accustomed to, and money has historically been a good source of motivation. This cycle continued even to the final days of the project as we were discussing more intricate details of our conjecture with Jack Martin during the open house.

By the end of the innovation cycle, we settled upon an idea we simply referred to as "The Box" to focus our attention on. This solution seemed to us to provide the most versatile solution to creating more available parking in the neighborhoods surrounding campus. This multi-space metering solution is not an eyesore and allows for the dynamic control of pricing as a means to regulate the influx of cars in a given area. By networking the boxes together, this also allows for live parking analytics to be gathered and shared with those looking for a spot and officials in charge of tracking such information. The Box also allows for more forms of payment to be used than a traditional meter such as credit cards and cash. We planned these boxes to have tight integration with a smartphone app that would allow the entire process of finding a spot and payment to be incredibly streamlined. By the same token, all of the same features would be available on the interface of The Box itself, so as not to discriminate against those without access to smartphones. As we mentioned already, the real genius of the box lies in its ability to regulate the price of parking based on availability, location, time of day, or any other factor that may become necessary since these systems are networked and can be controlled remotely. They also work in conjunction with residential parking permits so as not to bleed the wallets of those parking in the area on a daily basis that need ready access to their vehicles.

Our team consisted of three engineers and one industrial designer. This combination proved to be quite potent in terms of problem solving and the generation of out-of-the-box ideas. The engineers came to the table with a natural analytical and logical thought process. The industrial designer approached the problem from a different angle and challenged the rest of the team to see things outside of the simple cause and effect variables. He also proved invaluable in the creation of our final posters. With three engineers in the group, it was relatively easy to process the raw data that our research turned up and turn that into usable figures. Their knowledge of graphing software aided the poster design process while statistics concepts were put into practice in the application of our survey. We were obviously limited by the fact that there was no real plan to implement our proposals, so we had little leverage and had to approach third parties with a purely inquisitive conversation. Our lack of influence also created a few dead ends seeing as we were largely unable to contact the Cincinnati Police for parking information and received little response from the big developers in the area. Another difficulty that arose while gathering information was simply a lack of current statistics for the Corryville area in terms of parking. Most of our information was pulled from a 2005 study by OKI in the area. We were also reduced to simply calling parking garages in the area in order to obtain rough estimates as to what sort of utilization rates they were experiencing, as this information is not published. The results of these calls were somewhat surprising, though, as we learned that many garages in the area almost never approach their maximum capacity, meaning that there is an abundance of garage space to be utilized by residents or one of our Park n' Ride programs or long term parking solutions.

The final result of our collaboration was much more successful than we could have originally anticipated. The group worked very well together to develop a proposal to a colossal, and still growing, parking problem that our stakeholders seemed genuinely impressed by. It certainly instilled a sense of pride within the group to see the end result of our hard work received so well. It is unlikely that we will take action on any of these ideas, but it is definitely inspiring to know that we could. This project has reshaped our approach to problem solving and bestowed upon us a new appreciation for the problems faced by urban planners when trying to create the layout for a community, let alone a city, that will adequately accommodate the various needs of its residents.

Appendix- Figures and Team Communication

	41,970 students	
Full Time		30,260
	Undergraduate:	24,638
	Graduate & Professional:	5,622
Part-Time		11,710
	Undergraduate:	7,081
	Graduate & Professional:	4,629
Faculty Full Time		***2,717***
Faculty Part Time		***3,315***
Staff Full Time		***3,407***
Staff Part Time		***419***
Total (without students)		***9,858***

Figure 23: UC population statistics. UC.edu

New Developments and the parking deficit

	Units	Retail sqft.	Office sqft.	Parking spaces	Anticipated cars
Views on Vine	104	2 restaurants + bank- ~7000	0	138	132
Euclid Square	72	0	0	~72	72
Vine St. Flats	36	2 rest'ts- 7000	0	~36	36
Campus Park Apts.	442 beds	0	some	some	~442
Calhoun St. Retail	880	103,000		716?	1292
Uptown Crossing = University Edge	329 beds	0	0	200	329
University Village	500 beds	15,000			Plans fell through
Morgens Hall	528 beds	0	0	0	
USquare at the Loop	161	80,000	40,000	700	581
TOTAL				**1146- 1862 SPACES**	**2884 CARS**

Figure 24: Matrix on new and recent developments, and how many cars they will bring to the area. Information gathered from a variety of sources: uptowncincinnati.com, Jerry Seger (urban planner), and phone calls to the apartments and developments listed.

Facebook

Facebook was used frequently as a means of communication between team members. Ideas were exchanged, tasks assigned, and graphics and information transported. It was an unbelievably helpful device in the completion of this project. Some example screenshots are shown below, though Facebook has denied us access to some of our older posts.

Grant Cothrel
hey guys,

so we need to start work on this final report. i understand we have finals, so you can definitely wait to get those done before you do your piece, but i thought the sooner the better in getting this started.

frank emailed us all guidelines on how this thing should look. the subject line was
"Last minute poster comments and report guidelines." take a look at this.

i've got chapters 1 and 4. if you guys compile your own specific research (alex and survey, logan and interviews and metro, elliot and UCPD) i can compile chapter 3 as well. i've started a references section as well.

that leaves chapters 2 5 and 6. we can definitely collaborate on these, but people need to sort of step up and take these. also, if you guys could cite any sources you used, and send those to me, i'll put those in the reference section. and any raw data (alex and survey) should be organized to put in the appendix.

ALSO does anyone know Nathan's last name? he gave us the challenge.

less than a week and then we're done! please comment with what you can work on.

-grant
Like · Comment · Unfollow Post · Tuesday at 12:19pm
Seen by everyone
View all 7 comments
Logan Mirka yeah that's fine
12 hours ago · Like
Grant Cothrel yo logan you want zipcars and bikeshare too? you looked at both of those right?
6 hours ago · Like
Logan Mirka I did look at zipcars but not bikeshare
3 hours ago via mobile · Like
Write a comment...

OLDER POSTS

Grant Cothrel
hey guys,

just to be clear,
i'm doing slides 3-5 and slides 10 and 16.

do you guys know your slides? please comment with the slides you are talking about.
Like · Comment · Unfollow Post · December 6 at 11:27am
Seen by everyone
View all 3 comments
Grant Cothrel just texted u. u got the case study.

Grant Cothrel just texted u. u got the case study.
December 6 at 1:31pm · Like
Elliot Raderman 8,9, and 15
December 6 at 2:00pm via mobile · Like
Write a comment...

Grant Cothrel
hey gang,

tentative meeting time of 7:15 tomorrow at the DAAP. elliot, let us know if that needs to change. edits to the powerpoint will be made, and powerpoint will be run through at least twice i hope!

Elliot, if you could also email me the graphics in the posters, as well as the posters as PDFs, that would be swell.
Like · Comment · Unfollow Post · December 4 at 4:58pm
Seen by everyone
Grant Cothrel ALSO, we need some ideas on how to incentivize both the long-term parking and the park n' ride solution.
December 4 at 5:16pm · Like
Elliot Raderman I'll email you everything when we meet up just so you can tell me specifically what to pull from the posters. Also just have some organizational and graphical questions for you guys when we meet up. See you a bit later.
December 5 at 1:51pm · Unlike · 1
Write a comment...

Grant Cothrel
not to overwhelm you guys but,

everyone needs to start preparing their specific research for the final report. if you can each organize your sources, what you found from each source, and then sort of say how what you found added to the project/brought us closer to our solutions, that would be great. i'll ask frank, but i think you need to cite every source you used. also, include any graphics that you created in your research.

the report is supposed to include ALL of our research, so don't leave anything out.
...
See More
Like · Comment · Unfollow Post · December 4 at 11:34pm
Logan Mirka likes this. Seen by everyone
Write a comment...

Alex Clark
I finally got the graphs uploaded to the file exchange. Sorry about the delay, I was getting way too picky.

They're listed in the file exchange with GRAPH in the title.
Unlike · Comment · Follow Post · December 2 at 10:38am

You like this. Seen by everyone

Alex Clark Elliot
December 2 at 10:38am · Like

Write a comment...

Grant Cothrel
hey dawgs,

tomorrow at my place, 345 turner, if you can make it. 10 AM.
Like · Comment · Unfollow Post · November 30 at 11:43pm

Seen by everyone

Write a comment...

Grant Cothrel
hey all,

so are we meeting tomorrow? I'm available from 1:00 to 2:15, and then after 4:30.
Like · Comment · Unfollow Post · November 29 at 6:21pm

Seen by everyone

Alex Clark Im only available from 230 to around 5
November 29 at 8:26pm · Like

Write a comment...

Grant Cothrel uploaded a file.
and here's the flowchart on how to park: RPP v. multi-space meter!

rpp v meter flowchart.pptx
Preview · Download · Upload Revision

Like · Comment · Unfollow Post · November 27 at 10:23pm

Seen by everyone

Write a comment...

Grant Cothrel uploaded a new version of case study poster.pptx
updated it with info on berkeley too.

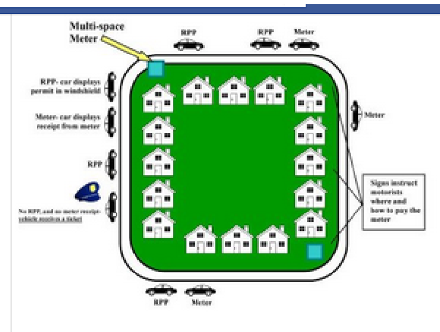
case study poster.pptx
Preview · Download · Upload Revision · History (2)

Like · Comment · Unfollow Post · November 27 at 9:30pm

Seen by everyone

Write a comment...

Grant Cothrel
this too.

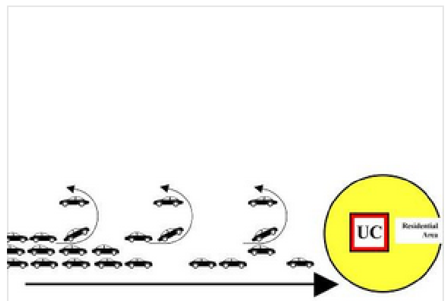


Like · Comment · Unfollow Post · November 27 at 6:36pm

Elliot Raderman, Logan Mirka and Alex Clark like this. Seen by everyone

Write a comment...

Grant Cothrel
hey guys, is this up to snuff?



Like · Comment · Unfollow Post · November 27 at 6:36pm

Elliot Raderman, Logan Mirka and Alex Clark like this. Seen by everyone

Write a comment...

Grant Cothrel
Hey also!

Alex we never talked about the utilization %s you found from your couple times counting cars. What'd you find so we can stick it on a poster or the powerpoint?
Like · Comment · Unfollow Post · November 20 at 6:24pm

Seen by everyone

Write a comment...

File Exchange on Blackboard (Blackboard.uc.edu)

Professor Frank Russell created a group for our team on Blackboard, UC's student website. Through the group's File Exchange system, our team was able to share numerous word documents, power-points, and graphics that contained pertinent information. Below is a sample screenshot of the File Exchange.

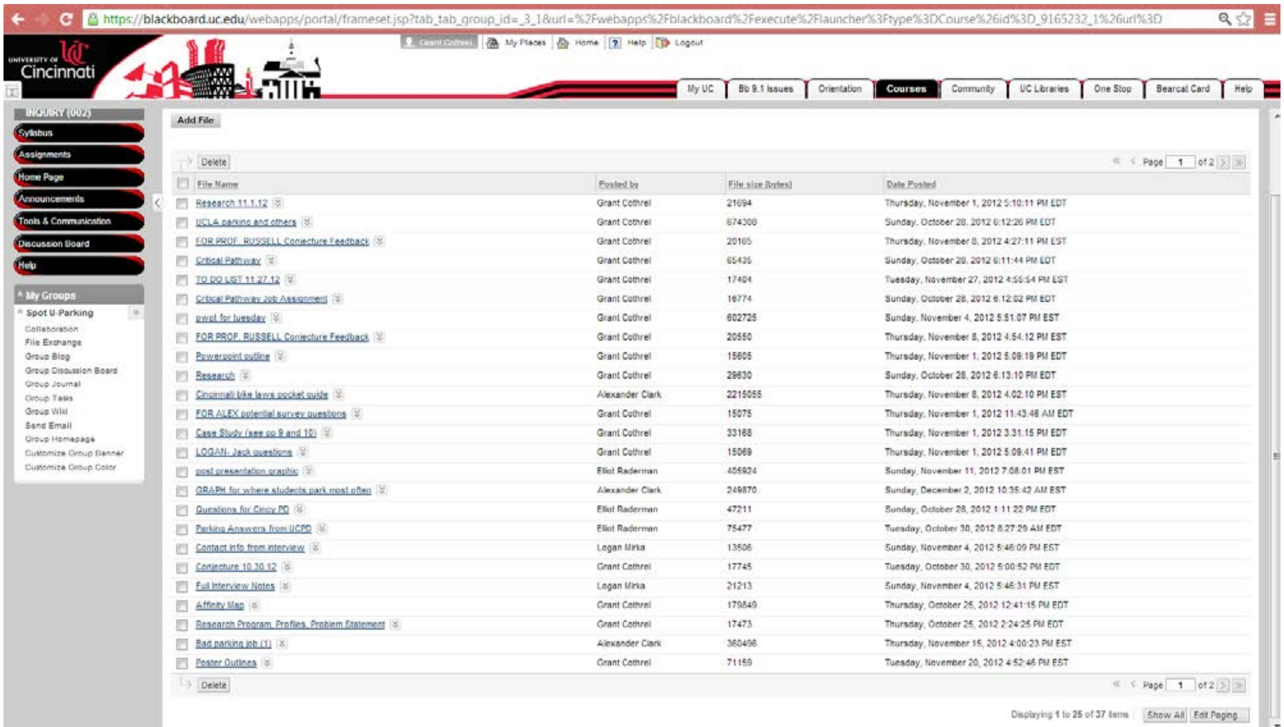
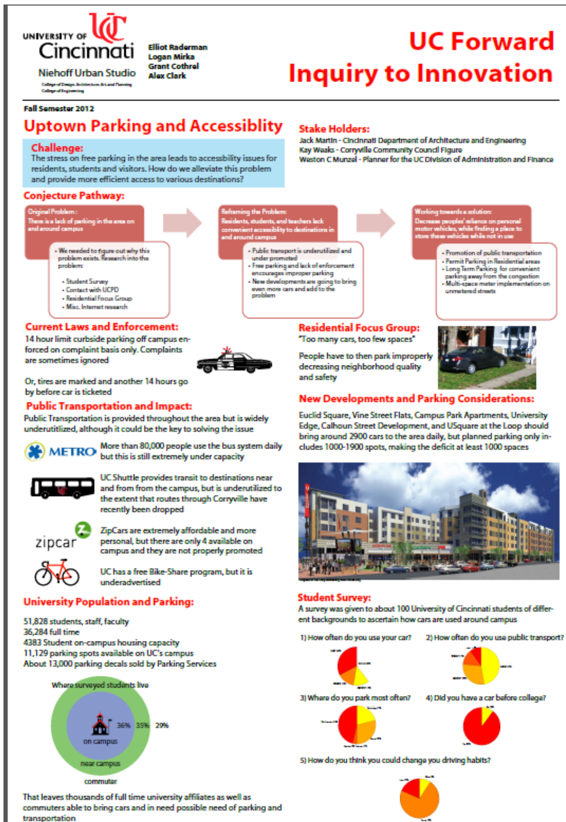
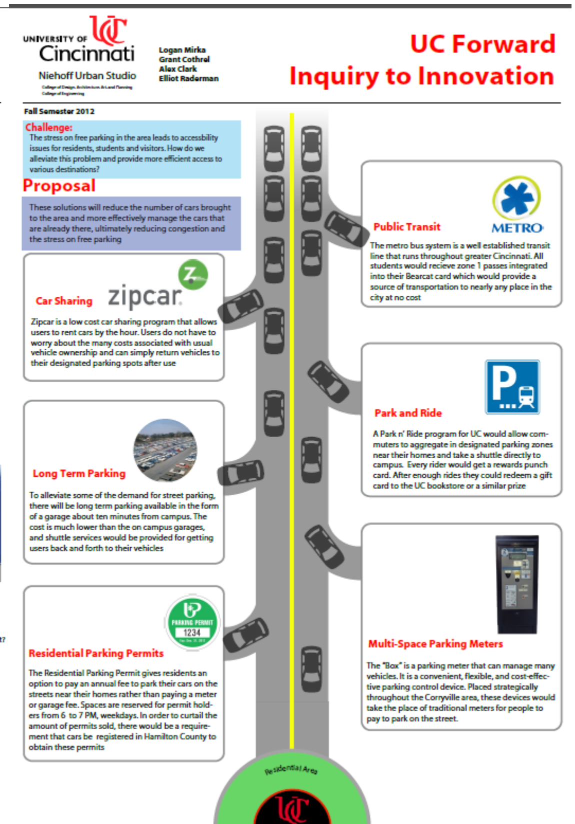


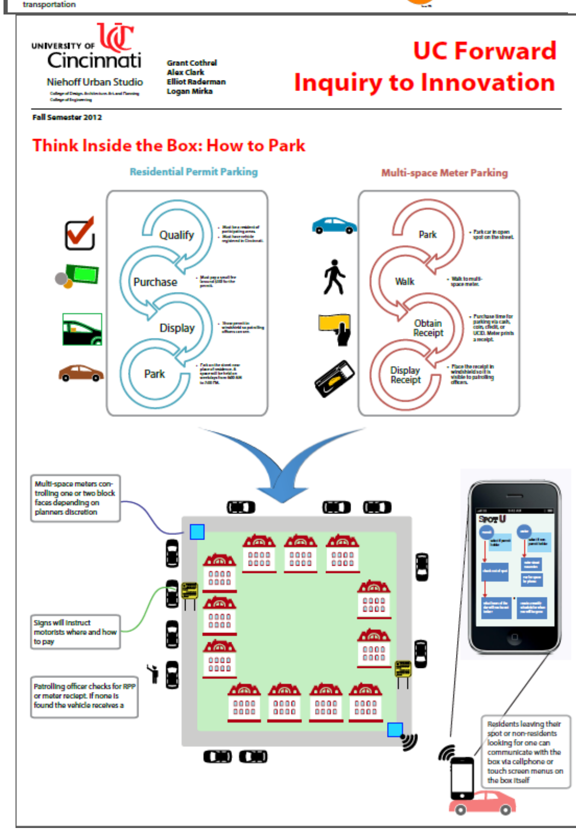
Figure 25: Screenshot of Blackboard's File Exchange

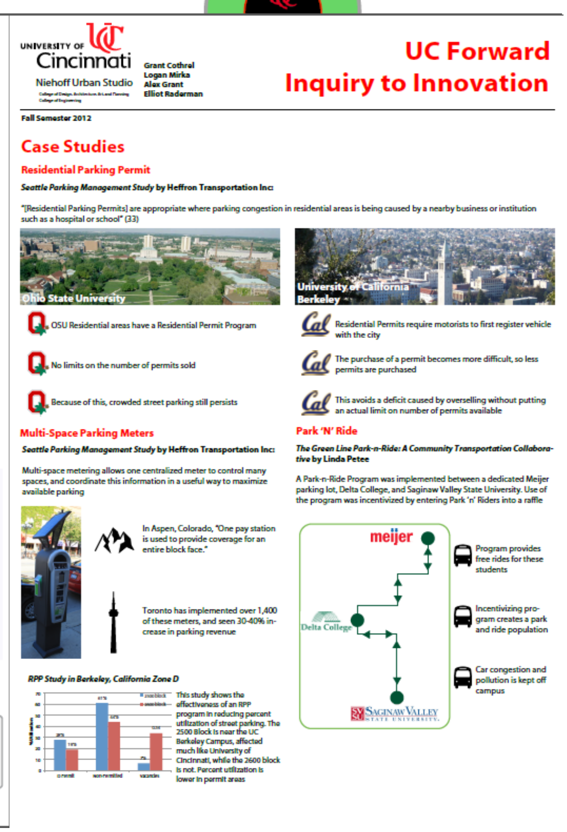
Posters

The top posters are our research, and the bottom posters are our proposal. Higher resolution versions of these posters were provided on Blackboard. These posters were presented to our stakeholders on December 6, 2012, and at an open house at the Niehoff Urban Studio on December 7, 2012.









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Interviews

Grant Cothrel interviewed *Jerry Sieger*, Urban Planner. Information on developments on Calhoun Street.

Logan Mirka interviewed *Jack Martin*, Cincinnati Dept. of Architecture and Engineering on his view of the parking problem in Corryville. Jack also reviewed our proposal.

Logan Mirka interviewed *Kay Weaks*, Corryville Community Council Figure on her view of the parking problem in Corryville. Kay also reviewed our proposal.

Logan Mirka interviewed a Hampton Inn parking employee about the capacity and vacancy of the Hampton Inn northeast of UC's campus.

Grant Cothrel interviewed information at: Views on Vine (513-861-9394), Campus Park Apartments (513-214-2436), and Uptown Crossing (513-556-5006)

All interviewed *Weston Munzel*, Planner for the UC Division of Administration and Finance for his views on the parking problem. He also reviewed our proposal.

Images

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