

Analysis and Optimization of Employee Parking for Company XYZ

*Lisa N. Portell Castro, EIT
Masters of Engineering Management
Héctor J. Cruzado, PhD, PE
Department of Civil and Environmental Engineering
Polytechnic University of Puerto Rico*

Abstract *Company XYZ has the need to reduce costs and improve personnel safety. Current parking accommodations are costly and unsecure. To resolve this issues three possible solutions were analyzed: parking re-distribution, construction of a multi-level parking garage, and an environmentally friendly solution.*

Key Terms *Alternate transportation, Telework, commute*

INTRODUCTION

Company XYZ was established in 1996 to regulate the telecommunications industry and provide services to its clients. At first instance, the company rented offices on a building in Hato Rey, Puerto Rico. As the company grew, it had the necessity to secure larger offices that would accommodate the company's needs. By 2007, the company acquired a building (Figure 1) in San Juan, Puerto Rico to hold its new headquarters. The building was improved and renovated for the eighty-seven (87) employees at the time and left room to grow. Even though the building was suitable to its employees, its parking lot did not provide the same benefits. At the time, the solution was to rent additional parking off-site across the avenue from the company's premises.

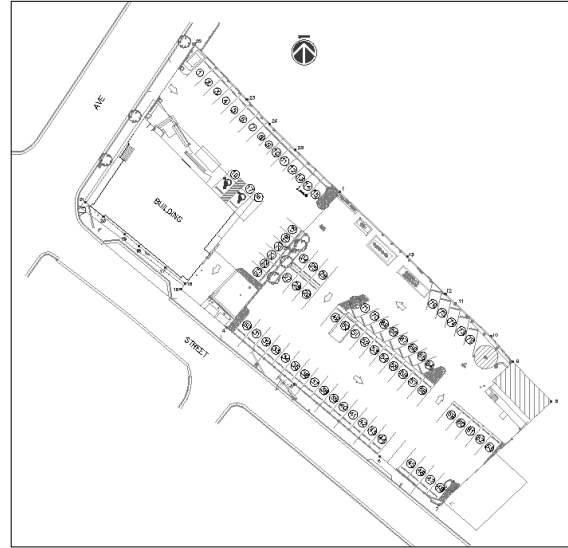


Figure 1 Company XYZ premises

PROBLEM

From the beginning the premises' parking lot was not fit to accommodate every employee and it was necessary to acquire additional parking spaces in an off-site lot. In the last few years, the company has grown from eighty-seven (87) employees to ninety-nine (99) employees, therefore increasing costs for parking. In addition, the off-site parking lot is not as secure as the premises' lot. The off-site parking lot is located across the high traffic avenue from the building putting at risk the employees who use it. Furthermore, the premises' parking lot does not meet the American Disability Association (ADA) for handicapped parking spaces. ADA requires four (4) for seventy-six (76) to a hundred (100) parking spaces [1], and currently the company provides only two (2) handicapped spaces. Budget cuts, the recession and the need to comply with ADA's requirements have forced the company to look for a more suitable parking scenario.

METHODOLOGY

Three (3) scenarios will be evaluated hoping to find a suitable solution for the company's problem. First, a re-distribution of the current parking spaces was evaluated. This consisted in the removal of the visitor's parking and contract parking on-site. The second scenario evaluated was the construction of a multi-level parking garage on-site. Finally, an environmentally friendly scenario was evaluated. This scenario evaluated several commuter benefit programs and/or employer sponsored trip reduction that could fit the company's needs.

Parking Re-distribution

The current on-site parking (Figure 2) scenario is as follows: four (4) visitors spaces, two (2) handicapped spaces, six (6) company cars spaces, and sixty-six (66) employee spaces for a total of seventy-eight (78) parking spaces. In addition, the company rents thirty (30) spaces and pays daily for five (5) additional spaces on an off-site parking lot. For each of the rented spaces the company pays \$107.00 per month. The company pays an average of \$8.00 per day for each of the additional spaces. Therefore, the total monthly cost for off-site parking is about \$4,010.00.

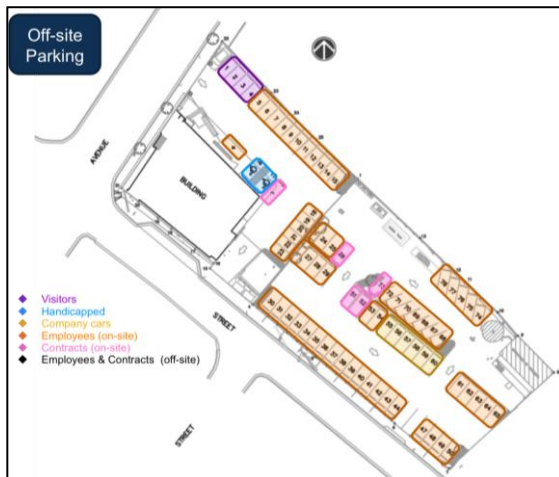


Figure 2 Current Parking Situation

By, evaluating the current situation it was determined that the parking space was not distributed efficiently. First, out of the sixty-six

(66) available on-site spaces only sixty (60) are being used for employee and contract personnel. One (1) company car space is not needed since one (1) vehicle has been decommissioned. Also, the company is not required to provide parking space to contract personnel.

To maximize the parking distribution the following options are proposed:

1. Remove visitors' parking.
2. Remove contract personnel at on-site parking.
3. Reassign unused parking space, including available company car parking space.

If the three proposed options were implemented (Figure 3), with the on-site parking lot would have a total of eighty-three (83) parking spaces. This would include the current two (2) handicapped spaces, five (5) company car spaces and seventy-six (76) employee spaces. Since the company has eighty-one (81) employees, this scenario will reduce the need to pay for off-site parking from thirty-six (36) spaces to five (5) spaces. This means that the company would reduce its parking costs from \$4,010.00 to \$500.00 per month, which represents a reduction of 87.53%.



Figure 3 Proposed parking re-distribution

Even though this scenario proposed a significant reduction in parking costs, it does not provide a solution for the unmet ADA requirement. In addition, it does not provide visitors' parking, even though it is not required, it would be considerable since the company receives a substantial amount of visitors daily.

Multi-Level Parking Garage

As part of the design for the renovation of the company's building a multi-level parking garage design was prepared. This design considered using the current parking lot for a five (5) story parking garage.

To determine if the construction of a multi-level parking garage is a viable solution, a construction cost estimate was done with the tool RSMMeans Online [2]. This tool takes into consideration the location where the project will be developed, which is essential to provide an accurate cost estimate. The cost estimate for a five (5) story parking garage to be built in San Juan, Puerto Rico will be \$4,720,000.00 (Figure 4).



Figure 4 Multi-Level parking garage cost estimate

This scenario would solve all of the company's problems regarding the parking situation since it would provide enough space for current and future employees, would have more than enough space to meet ADA's requirements, it would provide

parking for visitors, and since it would be located on the building premises, it would assure the employee and visitor's safety. However, this scenario is costly and the company is trying to reduce costs. Comparing current costs with the cost estimate it would take ninety-eight (98) years to benefit from the investment. This analysis does not take into consideration the construction logistics and indirect costs, like renting temporary parking spaces while construction. If these lasts were added to the construction costs it would be even higher.

Environment-friendly program

It seems imperative that new transportation options be developed and implemented in order to help alleviate the worsening air quality and the public health problems related to it.

After evaluating alternative transportation programs among different worldwide companies [3], four (4) programs were selected to be evaluated for the company (Figure 5).

Commuter Program (Carpooling)	Mass transit (Tren Urbano / AMA)	Shuttle (Vanpool)	Telework
<ul style="list-style-type: none"> • Incentive for Employees who carpool • Pros: More available parking, reduction in carbon foot print • Cons: Unappealing to employees, Not reliable, constant planning/ coordination 	<ul style="list-style-type: none"> • 90 days Unlimited Use Cards: \$67.50 (Monthly \$22.50) • Pros: More available parking, reduction in carbon foot print • Cons: Unappealing to employees, Not reliable, constant planning/ coordination, time 	<ul style="list-style-type: none"> • 2 Mini-vans (6 passengers each) • Pros: More available parking, reduction in carbon foot print • Cons: Unappealing to employees, Costly, not reliable, constant planning/ coordination, time 	<ul style="list-style-type: none"> • 21 employees working half-time from home • Pros: Appealing to employees, More available parking, reduction in carbon foot print, saving in costs. • Cons: No room to grow

Figure 5 Commuter Benefit Programs and/or Employer Sponsored Trip Reduction

The commuter program or carpooling purpose would be to provide an incentive to employees to share the commute with other employees, therefore reducing need in parking spaces. With this program there should be more available parking spaces and would have a positive effect on the environment.

Similar to the carpool program, the use of mass transit would be another possible choice. The program would require the company to provide employees with ninety (90) days of unlimited use for mass transit like *Tren Urbano* (the local rail-transit system) and *AMA* (the local bus system).

This card would have a cost of \$67.50. If compared to the regular costs of \$100.00, this would imply a cost reduction of 32.5%.

Another option would be to fuse the mass transit program with a shuttle provided by the company. This shuttle would ensure that travel time from the nearest *Tren Urbano* station decreased and employees would be more attracted to the idea. Besides the mass transit costs, additional costs like a purchase or rental of a van and driver would need to be taken into consideration and could probably go above and beyond the current costs. The only benefit of this program would be the reduction of carbon footprint into the environment.

The telework alternative suggests that employees work from home. This option would save money by reducing the need to rent parking spaces and would reduce carbon footprint into the environment.

Out of the four (4) alternatives analyzed, telework seemed as the more suitable option. The employee roll book was analyzed to determine how many employees would be suitable for telework.

Out of the eighty-one (81) employees of the company, twenty-one (21) are apt to work from home, leaving sixty (60) employees that would work from the company's building. Employees selected to telework would work half time from home and half time from the company's building. This would mean that the parking spaces for the people working from home would be available. Current parking spaces could be re-arranged and all employees could park inside the premises. As seen in Figure 6, eleven (11) parking spaces would be assigned to teleworkers and the rest would be distributed to employees and company cars. This scenario fits all employees and leaves five (5) parking spaces available for other uses; they could be used for handicapped parking, visitors or future employees.

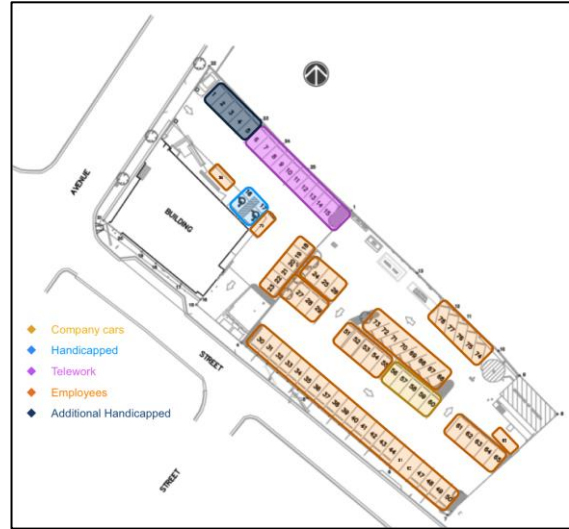


Figure 6 Telework parking distribution

Data from the United States Environmental Protection Agency (EPA) establishes that the average passenger vehicle emits about 423 grams of CO₂ per mile [4]. As the average of miles traveled daily by the company's employees is 43.05 miles, a total of 18,211.26 grams of CO₂ would not be emitted by each teleworker. Making this scenario extremely good for the environment.

This scenario meets all requirements for the company's needs for parking and it's environmentally friendly, therefore it's the best option of it all.

CONCLUSION

Out of all the scenarios analyzed for the company's need and requirements the best choice would be the telework program. This setup would reduce 100% the off-site parking costs and would reduce significantly carbon emissions. In addition, it has the alternative to meet ADA's requirements.

REFERENCES

- [1] Regla 1.5 – Estacionamiento, Reglamento para requerir que los establecimientos comerciales en Puerto Rico mejoren accesos a la comunidad con impedimentos, Núm. Reglamento 7400, 2007, pg. 4

- [2] RSMeans Online. (n.d.). Square Foot Estimator. Retrieved January 2013, from RSMeans Online: <http://www.rsmeansonline.com/>
- [3] Community Transportation Association. (2012, August). Transportation to work: A toolkit for the business community. Success Stories of Employer-Sponsored Transportation Programs.
- [4] United States Environmental Protection Agency. (2011). Transportation and Climate. Retrieved January 2013, from EPA: Transportation and Air Quality: <http://www.epa.gov/otaq/climate/documents/420f11041.pdf>