



Site Design for Schools: A Lesson Plan for Success

School site plans are often among the most complex civil engineering design challenges. There are many factors involved, not the least of which is the wide variation of both vehicles and drivers. Unlike most other sites, these public institutions must handle a large volume of staff and visitors, often in a very compressed time window, operating a wide variety of vehicles sizes. Keeping the site efficient while managing expeditious arrival and departure is important, but safety must be the primary design goal.

Successful site design requires an awareness of many behaviors, including those of staff, parents, students, bus drivers, and delivery personnel. Each has a specific – often different – reason for being on-site. Becker Morgan Group has a dedicated Educational Design Studio, including architects, landscape architects, and civil engineers, that have spent the last 30 years learning and understanding vehicular behavior surrounding schools and designing safe, appropriate responses to these challenges.

Guiding Principle | Safety

Safety challenges on a school site are primarily a matter of scale. Humans, particularly of school age, are small compared to school buses and delivery trucks. Ensuring safe passage from the bus or a parent/guardian's car to the classroom must be at the forefront of all site design decisions. The interior layout of the school can have a profound effect on the site layout, while site conditions may limit design options; therefore, civil engineering decisions can have a significant impact on the building. The lesson in school design is to engage a design team experienced with working together. Following is a brief description of the decision tree we consider, followed by a case study that illustrates our passion for school design.

Critical Decision 1 | Site Access

A school site should be located to provide a safe means of ingress and egress for bus traffic, pedestrian traffic, and passenger vehicle traffic. Ideally, the site will have the opportunity for multiple entrances, which can help both circulation and segregation. Oftentimes, off-site improvements such as road widening, traffic signals, and pedestrian crosswalks are needed to allow for large vehicle turning (72- to 84-passenger buses, for example) and to ensure safe pedestrian access. If the site has multiple road frontages, it is important to consider the nature of the traffic on the existing road and locate entrances where they make the most sense.



Critical Decision 2 | Site Circulation

Schools need to be treated like a campus, even if the school is only a single building. Each user group has a different destination, different mode of transit, different parking area. The behavior of the site changes depending upon the time – arrival, dismissal, and extracurricular events. Designers must provide easy, logical pathways for each visitor and take into account the potential for vehicular “stacking” at drop-off and pick-up times, which impacts circulation routes both on and off the site. The layout of the building program can have a significant influence on site circulation, and this is why having an integrated team of both architects and civil engineers is critical to school site design.



Critical Decision 3 | Vehicle Segregation

We have found that the most effective way to keep a school site safe and efficient is to segregate the different users and their vehicles. Some of the ways to achieve this include multiple entrances, loop roads, and independent parking fields or loading zones. While these elements are not always achievable, they are the ideal solution, and different techniques can be deployed to achieve similar results. A single entrance condition may divide traffic shortly after vehicles arrive on-site. Landscape architects may use planting beds or stormwater areas to designate one parking area from another. Architects may design a pass-through lobby, where bus parking is on the opposite side of the building from the car parking.



Case Study | High School Grad to Transportation Engineer



Christopher D. Duke, PE, PTOE, LEED AP, Associate Principal, shares his story, demonstrating how Becker Morgan Group engages with every community we serve and is committed to providing premiere design services.

As engineers, we like to solve problems. Identifying and figuring out how to implement creative solutions is in our blood. Watching those solutions come to life and seeing others reap the benefits is one of the most satisfying parts of the job. It's rare that we can fix a problem that we experienced firsthand – or in this case contributed to! – but in such cases, it's even more rewarding.

I grew up in Dover, DE and attended Polytech High School, graduating in 2001. I am a proud Polytech Panther. It's where my interest in engineering began and where I discovered I could turn this interest into a career that I love. During my junior and senior years of high school, I drove myself and my sister to school. We rocked out to Weezer and Green Day most mornings, along with the other 400 or so 16- to 18-year-old brand new drivers that also decided they were too cool to ride the bus to school.

Like many high schools of the day, the original layout of the site didn't prioritize separating staff traffic from student traffic from bus traffic when it was first constructed. In fact, everyone used the same single exit at the end of each day, which caused many, many issues.

When the final bell rang at 2:55pm, there was a 15-minute period for students to race to their lockers, then race to the buses waiting to take them home. Once the students were loaded up, there was one lucky teacher assigned as the crossing guard to let all 20 buses leave the school grounds with priority. This meant that the 400 brand new teenage drivers had 15 minutes to race to their lockers, then their cars, and then race through the parking lots to the exit before suffering the fate of being stuck waiting for the endless line of buses to depart, surely delaying them from whatever too cool for school activities awaited them at the end of the day.

You can imagine the issues this caused. A bunch of eager teenagers literally racing through the school parking lots in an effort to speed across the railroad tracks ahead of the rapidly approaching freight train. Adding to this recipe for disaster was the fact that 'The Fast and the Furious' movie was released in 2001, was a huge hit among us, and heavily influenced our driving habits. Days without fender benders were celebrated.

Fast forward to 2006. I was then a graduate of the University of Delaware's Civil Engineering program and working for Becker Morgan Group in Dover, DE (somehow, with a spotless driving record), which had a great reputation for school design in both the architectural and engineering worlds. Themes like separating bus traffic from staff from student traffic (thank you Vin Diesel) became super important. And low and behold, who brings in Becker Morgan Group to resolve an issue with on-site traffic circulation but my alma mater, Polytech High School. Coupled with a major building addition, we were able to redesign their parking areas, site circulation, and movements for ingress and egress to separate those movements from each other, leading to a much more organized – and safe! – exodus at the end of each school day.

As engineers, we like to solve problems. In this case, I am so proud to be part of the team that found the solution!