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Scientists/Engineers/Architects

Developing a Comprehensive Campus Materials
Management and District Plan: A Case Study

About the author

Victoria V. Sirianni is a specialist in operations and leadership development. She is currently the Senior Vice President for Corporate Operations at Thomas Jefferson University. Prior to this, Vicky served as Chief Facilities Officer for MIT. She served the Institute in positions ranging from designer to manager of the design and construction unit, space management, capital renewal, general maintenance, utility generation, purchasing, and distribution, for over 150 buildings covering 11 million gross square feet on 153 acres of land. Vicky holds an Ed.M. from Harvard University and an A.B. from Carnegie Mellon University. She has taught design courses and studied architecture at MIT as a special graduate student. She is a board member of the Massachusetts State College Building Authority, and a founding member of the Center for Balance by Design. In 2003, she was the recipient of the Boston Society of Architect's Women in Design Award, and is an honorary member of the class of '54 at MIT.

About S E A Consultants Inc.

S E A Consultants, Inc. has been providing creative and strategic design solutions for our clients since its founding as a civil engineering firm in 1956. Today, we are a multi-disciplinary, full-service engineering and architecture firm offering clients expertise in the areas of infrastructure, transportation, the environment, buildings, and in information technology. We offer a broad spectrum of planning and engineering disciplines, including water resources, civil, structural, environmental, bridges, highway/roadway, geotechnical, architectural and building services for our following client sectors: Energy Services, Federal/State/Military, Higher Education, Municipalities, and Transportation. We provide creative solutions that balance human and social needs with environmental stewardship.

Executive Summary

With the significant expansion and renewal of colleges and universities across the country, institutions of higher education are challenged to address the logistics of materials management. Planners and facility managers must balance increased vehicular and pedestrian traffic, delivery and distribution of materials, and removal of waste that come with growth, while retaining academic and aesthetic character.

All of this is happening in a time when many universities are expanding their efforts in environmental stewardship and setting more ambitious sustainability goals. An understanding of the negative carbon impacts of traditional operations—coupled with increasingly stringent environmental regulations—requires facilities managers to re-think how they operate. Operational owners at these institutions understand that the “make-do solutions” of the past are no longer adequate and they are looking for an informed plan to deal with traffic, delivery and distribution of materials, and removal of waste.

In a recent paper on creating sustainable campuses, Leith Sharp, Director of Harvard’s Green Campus Initiative, says, “It’s no secret that some green campus initiatives have been more successful in surviving and expanding their effectiveness than others. In analyzing why this is the case it appears that regardless of the organizational structure or the political positioning of any green campus initiative, [some] approaches evidently maximize the survival and expansion of pioneering initiatives...[and] utilize systems thinking to understand interrelationships and to perceive beneficial design solutions.”¹

By developing a clear and logical plan, institutions are able to deal more effectively with the “unintended” and “unseen” on their campuses. They can also improve operational efficiency by minimizing traffic, increasing safety, conserving resources, and creating a more attractive physical environment. The following study describes how S E A Consultants worked with Brown University in Providence, RI, to develop a successful and comprehensive campus materials management plan.

Colleges and universities are currently engaged in significant expansion and renewal of their facilities across the country. The economic robustness of private college and university endowments in the 1990s enabled these institutions to address long-standing needs. These needs included building for new and emerging fields of academic inquiry as well as addressing their burgeoning list of deferred maintenance on the buildings that were constructed thirty years earlier. This activity is projected to continue for at least another decade.

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¹ “Green Campuses: The Road from Little Victories to Systemic Transformation.” Leith Sharp, Harvard University, Cambridge, MA.

Executive Summary

S E A developed a comprehensive materials management plan for the entire Brown University campus, as well as planning for growth.

Changes in student lifestyles are further propelling expansion activity. Students' evolving expectations are fueling significant physical changes and adaptation needs, from new student centers and dormitories to academic service buildings. According to a recent survey conducted by *The Chronicle of Higher Education*, "facilities growth, paid for largely by private donations, is at the center of a spending boom in academic support for athletes."²

Coupled with changes in national demographics, the higher education market is more active than it has been for three decades. Colleges are practically being built from the ground up in some areas of the country, and urban campuses are expanding in non-contiguous ways due to space constraints. The trends are not prevalent only among wealthy, private institutions. State and public schools are becoming more like their private counterparts in terms of expansion needs. As a result, smaller private schools are finding it increasingly difficult to keep a competitive edge without significant expansion of their facilities offerings.

² "Spending Plenty So Athletes Can Make The Grade," Brad Wolverton, *The Chronicle of Higher Education*. September 5, 2008.

Brown University: A Case Study

Founded in 1784, Brown University is a member of the Ivy League and is renowned for the quality of its teaching, research and unique curriculum. It has a modest student population with about 6,000 undergraduates and 2,000 graduate students engaged in 100 programs of study including a medical school. Admission is extremely competitive and correspondingly, its services and facilities are extensive. It has a faculty of more than 650 and employs a staff of 3,500. Brown is also home to extensive library holdings, a museum, and art gallery. The campus is composed of 238 buildings of varying age and size on 143 acres of land within the city of Providence, RI. Its research network is wide-ranging and ever growing including advanced academic institutes, centers, and facilities that make it a world-renowned university.

In 1999, the university began planning for one of the largest facility projects in its history: a new \$100M, 186,000 - sf Life Sciences building, adjacent to a complex of biomedical buildings. The project modernizes and expands laboratory and research space and is designed to encourage scientific collaboration among faculty, staff, and students by uniting complimentary research under one roof and increasing the overall biomedical research level on campus by fifty per cent.

To better understand the impact that this and subsequent expansions would have on its campus, Brown University selected S E A Consultants to provide three services:

1. Develop long-term development criteria for all campus zones and for all major service support, delivery, and waste-management operations
2. Identify strategies and guidelines for new construction and renovation retrofits
3. Develop an integrated approach to improve vehicular and pedestrian access, reduce pedestrian/vehicle conflict, and make long-term improvement to open spaces and public ways

Using a methodology that includes data collection, analysis, integration, and client interaction, S E A developed a comprehensive materials management plan for the entire Brown University campus, as well as planned growth on College Hill and beyond.

The team established the best parameters for the study and established a collaborative exchange with a diverse group of facility and university users. This case study shares successes in developing appropriate and effective short-term, mid-term and long-term solutions.

Brown University needed to understand the impact of one of the largest facility projects in its history.

Each materials management principle was tied to, and supported by, a master planning guideline.

The S E A methodology closely adhered to and supported the ongoing campus framework plan. It involved:

- A clearly defined project scope with clearly stated goals
- An agreed-to process for planning and implementation
- A detailed plan for anticipated growth on College Hill and beyond
- Operational and infrastructure recommendations for a campus-wide service system
- A district plan for the next anticipated area for development
- A short- and long-term implementation plan for the university as a whole

Although some elements are unique to Brown's environment, the six-step process of developing a successful strategy is applicable to institutions facing similar challenges.

Step One:

Establish an Effective Project Scope and Team

Working with the University staff, the S E A team created a scope of work to meet the requirements of the development criteria. Scope development focused on the fundamental purpose of the study: to support a plan that would provide criteria for ongoing operational management, a roadmap and set of guidelines for growth, and an integrated series of recommendations that would improve pedestrian and vehicular traffic. Key to its success was an understanding that the three principles of the strategic framework master plan being simultaneously developed, must, in turn, guide S E A's work. As a result, each materials management principle was tied to, and supported by, a master planning guideline.

Articulating the scope of services and parameters of operational needs was key to the success of the project. In this early stage, the team established an understanding with the University that materials management must include the teams of operational in-house and outsourced staff, and that the scope would include vehicular access with streets, driveways, loading docks, waste-collection enclosures, and selected portions of the pedestrian walkway and open-space systems.

Five types of operations were identified:

1. Delivery of incoming goods and services
2. University and USPS mail
3. Custodial and grounds maintenance
4. Hazardous materials management
5. Waste and recycling

These critical first steps enabled the project's success. Clear and articulate parameters for communication and information exchange were set, agreed to, and met by all members of the team.

Step Two:

Follow an Effective Planning and Implementation Process

Brown University operators and senior officers drew on S E A's significant experience with materials management solutions and strategies for institutional clients. These University leaders articulated the need for the plan to identify a champion tasked with continued oversight, application, and updates. Furthermore, they recognized and could speak to problems caused by lagging funding and planning for infrastructure support. Together with S E A, the operators and officers were able to guide the University with a series of recommendations. Ultimately, five integrated plans were developed to address: transportation, utilities, lighting, wayfinding, and a comprehensive plan.

The plan must include a champion tasked with oversight, application, and updates.

The recommendations addressed two competing needs at the University. First, they included methods to incorporate materials management into the ongoing development process. Second, they addressed ways to present a proposal that would assure that infrastructure improvement does not lag behind capital project development. By thoroughly documenting existing conditions and framing recommendations based on emerging institutional principles, S E A and Brown developed guidelines for future project implementation. Finally, S E A advised the University on the benefits and pitfalls of implementation to ensure that a planned response to materials management requirements would be sustainable.

Step Three:

Plan for Growth on College Hill and Beyond

The team had already determined that only about twelve percent more build-out was possible in the College Hill area—the traditional hub of Brown. Moving beyond this core was a near-term need. It was incumbent on the team to identify and understand the current condition of their district precincts and to consolidate services wherever possible. The University wished to minimize traffic, and ensure that the remaining facilities development on College Hill would not exacerbate the condition of overtaxed systems.

Accordingly, S E A developed a comprehensive plan for managing materials as one of the five detailed plans the University sought, all based on the strategic framework plan. The other detailed plans were transportation, utilities, lighting and way-finding.

Plan principles included improving circulation, consolidation of the campus core, and improving existing infrastructure.

The principles for the strategic framework plan became the planning principles for the materials management plan, including: circulation, consolidation of the core, moving beyond College Hill, and improving the existing circulation infrastructure.

In each instance, S E A documented existing service routes, circulation, pedestrian/vehicular conflicts, waste generation and removal, and pedestrian access and open space. The team incorporated elements of proposed growth and developed thumbnail sketches of existing and proposed conditions, outlined areas of improvement, and proposed a series of planning guidelines that would help in developing remediation options. These sketches also helped inform needs for service, loading, and delivery facilities. By developing extensive documentation on existing and proposed conditions, the plan allowed information—and any resulting problems—to become the immediate knowledge of all stakeholders. These documents, in turn, could be used as reference for ensuring future funding for the remediation that would be required for the full build-out of College Hill.

S E A also provided Brown with documentation for future development planning efforts beyond the Hill. In effect, the University had the most complete picture it could on problematic issues within its current conditions, and a planned and thoughtful approach to eliminating these problems in future facilities.

Step Four:

Create Operational and Instructive Recommendations for a Campus Wide System

After the team completed data collection and analyses, team members created specific recommendations for improving operations and support services. These included how to efficiently deliver and distribute incoming and outbound goods and services such as mail, hazardous materials, waste and recycling. Proposed new service hubs included hazardous waste, mail, custodial and grounds service.

Because most operations were under single administrative leadership, a unified and prioritized plan for remediation was easier to achieve. In all cases, the recommendations first summarized existing conditions and then proposed a series of options that would create more efficient operations, decrease traffic by eliminating systemic redundancies and pedestrian/vehicular conflicts, and be environmentally responsible. The team provided extensive documentation in this part of the project because any planned solution would likely be deployed in phases over several years.

This step provided the University with a thorough approach and the best methods of managing materials on their campus in the interim, and for its future campus development.

Step Five: Create a District Plan

Of the eight precincts identified in the framework and materials management plan, one seemed to have the most well defined proposals for new development in the short and long term. Because of the lack of open space amenities and pedestrian pathways, it also had a greater need than any other precinct for new infrastructure of all types.

Drilling down deeper into this particular district area, the team was able to make a series of recommendations for the short-term (1-2 years), mid-term (2-6 years) and long-term (6-25 years) on issues such as waste, recycling, and developmental siting for delivery and projected infrastructure needs. The team also identified a series of longer-term actions that would require more detailed analysis and planning for short-term projects. By identifying them in this manner, adequate planning information would exist to help inform these projects as they went forward.

Lessons learned from this “focus district” would help inform more detailed future planning of the remaining districts.

Extensive documentation supported the option of phased implementation over several years.

Step Six: Implement the Action Plan

Although the specifics of implementing the action plan at Brown may not universally relevant to materials management, many elements are shared. Implementing materials management solutions and strategies within a college or university does not happen easily. It requires financial and staff resources, adoption, oversight and the involvement of many administrators and operations managers. Often, successful implementation requires a strategy within a strategy, i.e., a strategy on how to move it within a dispersed and often divergent institutional governance process.

Working with administrators at a variety of universities and institutions, S E A has developed a series of short- and long-term implementation actions and solutions to common and complex problems. In doing so, S E A provides administrators with a game plan to keep the project alive, to keep the need at the forefront of the decision-makers’ minds, and most importantly, to move systematically to achieve the desired outcome. In most cases, the short-term actions require few additional resources or effort, but instead require comprehensive institutional buy-in to the issue, problems, and potential resolutions.

Lessons Learned

- Every Institution is unique, and every solution to a problem must be unique. Nevertheless, S E A's experience in this area suggests there are operating guidelines for successful planning to manage the unintended problems on campuses.
- A clear methodology is required to establish the correct data parameters and that uses the data consistently to determine viable solutions.
- A planned approach is possible and increasingly necessary for urban campuses that face stringent demands on the movement of materials, vehicles, and pedestrians on their campuses.
- The solution will be only as good as the process and as good as the team that determines the solutions. Total involvement and commitment is required of all team members, including university administration, facilities staff, and the consultant.
- Setting project goals early and agreeing to a project approach are keys to success.
- Solutions to a planned approach to materials management on campuses encompass operational as well as physical retooling.
- There are a variety of data collections that determine appropriate solutions. The success of the solutions is often rooted in determining the right amount and type of data to collect.
- University governance often requires a strategy offering solutions to complex management problems.
- Campus sustainability is enhanced by a clear approach to materials management systems.

Conclusion

At the end of this process, Brown University had a complete picture of current operations, constraints, and needs for their extensive development program. They also had a series of recommendations for both immediate and future action that encompassed operational and physical adjustments. Recognizing that institutional demands can often change, they had enough information to make informed decisions to go forward. The team provided priorities and options so the University could move ahead with feasible, practical projects that met the goals of the materials management plan.

The work that was done for Brown was extensive, and it was expanded upon as the needs became more defined. In some areas of University concern, S E A provided detailed, specific knowledge, while in others a more comprehensive, high-level view was necessary to achieve the University's vision. S E A's extensive knowledge in this area and within the higher education community enabled the team to be nimble in the provision of services to the University.



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SEA CONSULTANTS INC.
Scientists/Engineers/Architects

Phone: 1.800.489.6689
Web: www.seacon.com
E-mail: future@seacon.com