

T+G

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BUILDING
IDEAS Vol.4

'Systemic Action Research in the Build Environment'

BUILDING
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Town+Gown is a systemic action research program marshaling academic and practitioner resources to increase applied built environment research across disciplines and sectors. As new and previously unresolved built environment issues become apparent, so too the unmet need for applied research to increase common understanding. Town+Gown scales long-standing structural hurdles in the built environment that have made increasing applied research difficult—low levels of investment, low levels of public sponsorship, inadequate linkages between research and application, and fragmentation among the built environment industries and disciplines. The city’s inter-related physical and social settings serve as a laboratory for applied research in the built environment, but research conducted within a complex and dynamic social system requires active attention to context. Systemic action research, a form of cooperative inquiry involving both practitioner and academic as equal partners in knowledge creation, addresses the continual need to integrate research within the broader context and provides a “learning architecture” in which system stakeholders can bring about change¹.

In a complex system such as the built environment, where equally complex issues are embedded into its fabric, it is necessary to conduct applied research explicitly within the context of that system. The Town+Gown Research Agenda is the program’s primary mechanism to engage academics and practitioners on applied research and encompasses a non-linear process, with multiple perspectives, research methodologies and types of academic-practitioner collaborations.² The purpose of generating research results within a broad, open and cyclical process is to increase the common knowledge base and support systemic change over time. At the end of each academic year, Town+Gown abstracts the results of all completed projects in its annual review, Building Ideas, which is disseminated within the Town+Gown community, setting the stage for reflection among participants and future action based on research. Following the release of Building Ideas, the annual symposia series provides a space for Town+Gown members to reflect upon and explore the topics raised by completed projects so that they may collectively use research results to inform future changes in policy and practice. The action research methodology facilitates changes in practices and policies through “the use of small working groups around participants’ practice — what action learning practitioners call ‘action learning sets’ — with repeated cycles of action-reflection.”³

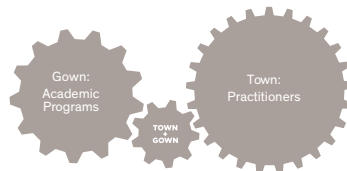
In its fifth year of operation, Town+Gown has hosted a total of 77 completed projects with 24 practitioner partners and 23 academic programs, and two series of symposium events, using completed research projects as the foundation for open-ended conversations among Town+Gown members. This Volume 4 of Building Ideas represents the capstone of Town+Gown’s 2012-2013 academic year. Following the lead of the Research Agenda, earlier volumes of Building Ideas were organized along the lines of the five academic disciplines — Management, Economics, Law, Technology and Design (with architecture, civil, structural and mechanical engineering, and other allied design fields) — that comprise the recognized inter-disciplinary built environment field, supplemented by the addition of Geography to cover urban planning and land use issues. Since the Research Agenda has changed its format and functionality to be more flexible for users, with multiple search terms, this Volume 4 moves away from the rigid disciplinary format and synthesizes some of the project abstracts with proceedings of symposium events into “action learning sets” currently underway and organizes the remaining project abstracts within general topic areas as a foundation for future action learning sets. The design of this Volume 4 seeks to enable the multiple threads of conversation on each topic to be experienced in parallel. Topic headings in **grey** signal an action learning set. These topic headings break the text into two sections running concurrently. Above the headings, text in **blue** type signals the proceedings from symposium events or descriptions of future action set topic areas, and below the headings, text in **green** signals project abstracts.

See the Town+Gown website at www.nyc.gov/html/ddc/html/design/tg.shtml.

1. Danny Burns, Systemic Action Research: A Strategy for Whole System Change (Bristol: 2007), p. 1.

2. Paul Chynoweth, The Built Environment Interdiscipline: A Theoretical Model for Decision Makers in Research and Teaching (Proceeding of the CIB Working Commission Building Education and Research Conference 2006), <http://www.lawlectures.co.uk/bear2006/chynoweth.pdf>, pp.1-5.

3. Sonia Ospina, Waad El Hadidy and Amparo Hofmann-Pinilla, “Cooperative Inquiry for Learning and Connectedness,” Action Learning: Research and Practice, July 2008, 5:2 (Taylor & Francis), pp. 131-147; online reprint, <http://www.informaworld.com/smp/content-db=all?content=10.1080/14767330802185673>, pp. 3-4.



The first symposium event of academic year 2012-2013 used, as departure points, a Ph.D. dissertation entitled *What Is the State of Building Information Modeling and Integrated Project Delivery in Public Sector Construction?* (see abstract below); Information [→]

ACTION LEARNING SET

Multiple Investigations into Building Information Modeling in Public Works Construction

PROJECT ABSTRACT

What Is the State of Building Information Modeling and Integrated Project Delivery in Public Sector Construction?

Town: NYC DDC
Gown: NYU/Poly

In the first doctoral dissertation completed under the auspices of Town+Gown, Mei Liu, Ph.D., sought to identify a methodology for public owners to utilize BIM technology and processes and to implement the principles

of integrated project delivery (IPD), a complementary relational contracting form, within existing public construction statutory constraints, and quantify resulting avoidable costs. Liu conducted a survey of the origins and nature of BIM, public construction statutory constraints and elements of the design-build service delivery methodology that corresponded most closely to BIM's optimality, identified advantages offered by BIM technology and [→]

[→] Systems in Project Management Course, a 2011 fall semester course at Polytechnic Institute of New York University/Department of Civil Engineering; and the New York City Department of Design and Construction's BIM Guidelines, issued to bring building information modeling (BIM) to bear on DDC's public building design and construction processes, with the ultimate goal of expanding BIM use across its portfolio of projects as well as expanding the functionality of resulting BIM models to include post-construction occupancy activities.

BIM evolved to building construction from the parametric solid modeling software platforms used in the automotive and aerospace industries, creating opportunities for bridging the divide between design and construction functions and phases in order to avoid costs created by the divide and reduce schedule and cost volatility, while maintaining quality. Able to hold amounts of linked spatial, schedule and cost data, BIM programs permit project participants to explore various designs at the earliest possible stage as well as inter-relationships among design, constructability, schedule and price. BIM can quickly redefine these relationships resulting from changes in design, thus eliminating archetypal information asymmetries.

The presentation led to a wide-ranging conversation that illuminated several potential future research projects. In view of the potential for avoided costs from BIM implementation, there was a discussion about the types of project cost data that would be necessary to evaluate the impact of BIM on a project and measure avoided costs. DDC's linkage of BIM to post-completion occupancy activities led to the suggestion that applying BIM to existing structures, via "Laser Interferometry Detection and Ranging" (LIDAR) technologies, would have benefits to first responders to emergencies, such as fires. The last issue raised was that of interoperability to facilitate collaboration

among participants with different programs from design to construction and throughout the lifecycle. [End]

SYMPOSIUM SYNOPSIS

Service Delivery Not Procurement, April 18, 2013

Participants at the third event explored the effects of statutory limits on the perceived ability of public owners in New York State to drive innovation in project service delivery and exploit opportunities made possible by BIM. The conversation started with the proposition that the terms people use to describe "what they do" can obscure possible routes to innovation, especially in public sector practice where terms have roots in various processes at the larger enterprise level. The event focused the conversation lens on opportunities to innovate at the construction project level despite the structural dissonance between enterprise-wide management systems and those at the line agencies, as well as dissonance among the component systems. This required talking about delivering projects and not about procurement or contracting, which often happens when discussing public capital projects.

The topics discussed ranged from leveraging GASB Statement Nos. 33 and 34 to identify opportunities to broaden and integrate the focus of line agencies during the life cycle of an asset by identifying and implementing enterprise-wide activities; continuing the analyses begun in the BIM-related research to quantify avoidable costs from increasing integration of design and construction processes and reducing information gaps; developing a model to connect current capital planning, budgeting and procurement decisions to long-term operations and maintenance costs; applying lean construction principles to all process elements to reduce waste; and developing [→]

Multiple Investigations into Building Information Modeling in Public Works Construction

[→] IPD principles consistent with the statutory environment, and proposed a model—integrated design-bid-build (IDBB)—at least some features of which most public owners could implement on projects without a change in law.

Liu applied data mining techniques, such as neighborhoods, clustering and trees, higher level techniques of networks and rules, and statistical analyses, to DDC's public building change

order data to identify systematic relationships and patterns in the database and among variables. In addition, using Bayesian Decision Theory, Liu developed an equation to predict the value of the contingency an agency should hold for a specific project. The IDBB model was also the subject of a controlled experiment, the results of which, along with analyses described above, suggested a range of avoided costs on public sector work as the result

of implementation of IDBB. The analyses led to the conclusion that use of IDBB—or the use of BIM and some IPD principles—on a public construction project would permit the public owner to avoid certain costs as compared to projects done without BIM and IPD principles.

Liu suggested follow up research to develop and conduct a survey on BIM and IPD use to substitute for the expert subjective opinion derived from the

controlled experiment, as well as to use a public project data set that contains large public projects. She also suggested additional research to assess the cost of limits imposed by public construction law on the ability of public owners to use BIM and IPD principles. [End]

[→]management methodologies to integrate construction participants with design as soon as possible to create one team for one project. Several of these ideas could be implemented via the design strategy methodology by which the city enterprise would envision a fully-BIM-enabled construction-to-operations-and-maintenance program and then walk back to identify the steps to make it happen. [End]

Resulting Action: A follow-up symposium event, BIMapalooza, on November 12, 2013, continued to explore the issues raised above, in particular, the issues of interoperability and evaluating the impact of BIM use on existing structures. [End]

SYMPOSIUM SYNOPSIS

Roadway.2—A Work in Progress, February 12, 2013

The second symposium event evolved from an earlier action learning set, at which a discussion intended to focus on data issues impeding life cycle cost-benefit analyses of road reconstruction projects spontaneously morphed into a collectively-experienced introduction [→]

ACTION LEARNING SET

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Multiple Investigations into Designing “Under the Roadway”

Multiple Investigations into Building Informa

PROJECT ABSTRACT

Overview of the Law of Private Utility Regulation: The Law and Economics of Utility Regulation

Town: NYC DOT, NYC OMB, NYC DDC
Gown: Brooklyn Law School

During the summer phase investigating the capital planning and investment behaviors of publicly regulated utilities, Tierrance Charles, a law student, surveyed the law of private utility regulation, linking seminal cases to the evolution of economic theories.

Of the several regulatory methodologies identified by Charles that are intended to substitute for the competitive market price mechanism, economic theory has identified one as potentially distorting the regulated firm's capital investment decisions. The traditional rate of return methodology permits capital costs to be part of the formula setting regulated price, and theory suggests that without countervailing regulatory tools, the methodology itself can create [→]

[→]to the “on the ground” reality of city streets—namely, that they rarely approach their technical or design useful life period due in large part to the volume of cuts made into the roadway by private utilities. This reality appears to have rendered the collection of roadway life cycle cost data to be institutionally perceived as irrelevant. The interrelation of city and publicly-regulated private utilities infrastructure practices emerged as an immediate area for further research because it appeared to be directly connected to data gaps. Legal analyses on the nature of the regulatory environment in which private utilities operate took place during the summer and the fall semester, and a

[→] a bias toward over-investment in capital assets, a situation at odds with the reality under the roadways. Charles suggested further research and analysis of the state’s regulatory framework and case law, focusing in particular on the rate of return methodology, for the regulated utilities that operate under and near the city’s roadways as well as identifying any data-based analyses of this distortive effect in regulated industries with infrastructure under the city’s roadways. [End]

PROJECT ABSTRACT

Overview of the History of New York State Private Regulation Law: Regulation of Gas, Electricity, and Telecommunications

Town: NYC DOT, NYC OMB, NYC DDC
Gown: Brooklyn Law School

At the same time, Michael Brantl and Lior Sapir, law students, conducted an historical overview of New York State law governing gas, electricity and telephone commodities from invention to the present, with Brantl focusing on the statutory history as it related to the development of the commodities and

Sapir focusing on the related case law as well as the case law of the public roadway. Brantl and Sapir created a chronological index that reveals both physical and legal evolution across commodity types in the context of evolution of public roadway law. The physical roadway is thus deconstructed into sets of legal arrangements based on public ownership of the roadway itself, from the road surface on through to the dirt beneath, in trust for use by the public, with multiple subsurface public uses (mass transit and water and sewer facilities) and multiple private uses that are publicly regulated at federal and state levels due to the public purposes involved and also regulated at the local level via various contract instruments. The product of this methodology will permit future researchers to toggle between what is visible in an open street pit during roadway reconstruction and the historical context giving rise to the visual spaghetti of conduits, providing a foundation for improved “under the roadway” design to be financed by a combination of public and private resources. [End]

Multiple Investigations into Designing “Under the Roadway”

geospatial analysis of utility cut permit data in the spring semester identified the geographical characteristics of intrusions into the city’s roadway infrastructure.

Those at the event focused the conversation on the relative merits of strategies used in the past and those that have been proposed. Rapid changes in technology, such as the introduction of cable, and the combination of unknown pre-existing conditions of original infrastructure and the limits of paper-based evidence of “as built” conditions contributed to the failure of a “defined utility lane” protocol across the city. The conversation explored aspects of shared [→]

PROJECT ABSTRACT

Overview of Rate Setting Process in New York State: How New York Sets Rates

Town: NYC DOT, NYC OMB, NYC DDC
Gown: Brooklyn Law School

The fall phase involved a focus on New York’s regulatory process. Starting with a summary of state regulatory rate setting processes, generally, as the foundation, Alexander Goldman, a law student, described New York State’s process and then used a 2009 rate setting process for Con Ed and Fisher Island Electric Company as case studies for how the process handled the cost of capital in the context of the rate base and the approved rates. [End]

PROJECT ABSTRACT

The Multi-Purpose Utility Corridor Hypothetical: Telecomm, Gas and Electric Utility Analyses

Town: NYC DOT, NYC OMB, NYC DDC
Gown: Brooklyn Law School

The centerpiece of the fall phase, tying all the analyses together, involved a hypothetical fact pattern intended to illuminate the operational and financial impacts of adopting a multi-purpose

utility corridor design under the roadway on a fictional horizontally-integrated private utility. Lior Sapir and Alexander Goldman, law students, used the published tariffs for Verizon and Con Ed in order to identify and explore the inter-related issues. Telecommunication, gas and electric utilities are each separately regulated at the federal and state levels of government. The analyses revealed a recursive collective action problem in which the least optimal social outcome is achieved when each actor pursues its individual economic interest. The “under the roadway” condition appears to be created by an aggregation of “multiple individually rational decisions into collectively self-defeating or even self-worsening outcomes.”¹ Significant systemic elements creating such conditions include the physical fact of multiple commodities possessing different physical characteristics and technological histories located and operating within constrained physical subterranean spaces. These physical facts are further exacerbated by legal facts of ownership by different local provider entities [→]

1. Robert C. Hockett, It Takes a Village: Municipal Condemnation Proceedings and Public/Private Partnerships for Mortgage Loan Modification, Value Preservation and Economic Recovery, Cornell Law School, Legal Studies Research Paper Series, No. 12-12 (<http://ssrn.com/abstract=2038029>), p. 2.

[→] public and private assets without reaching any conclusion in the face of continued revelations of financing complexities—while the several utilities each bear the costs of assessing and upgrading the condition of their respective underground infrastructure, when this occurs in the context of public debt-financed road reconstruction projects, there are collateral inefficiencies due to the lack of coordinated practices and, when appropriate, design solutions, that exact externality costs on both public and private sector ledgers. Case study and typology analyses were identified as next steps in this ongoing research project. [End]

Multiple Investigations into Designing “Under the Roadway”

[→] that are often components of larger multi-jurisdictional operations, each with different legal relationships and histories within the jurisdiction and multi-level regulatory environments. The analyses suggest, consistent with the theory of recursive collective action, that the intervention of a single motivated and empowered actor—perhaps, in this case, the city, acting in its role of public owner—could initiate a conversation aimed at identifying solutions. [End]

PROJECT ABSTRACT

Permit Density: Aggregate Road Cuts from Multiple Overlapping Contractors (2008-2012)

Town: NYC DOT, NYC OMB, NYC DDC
Gown: Columbia/GSAPP

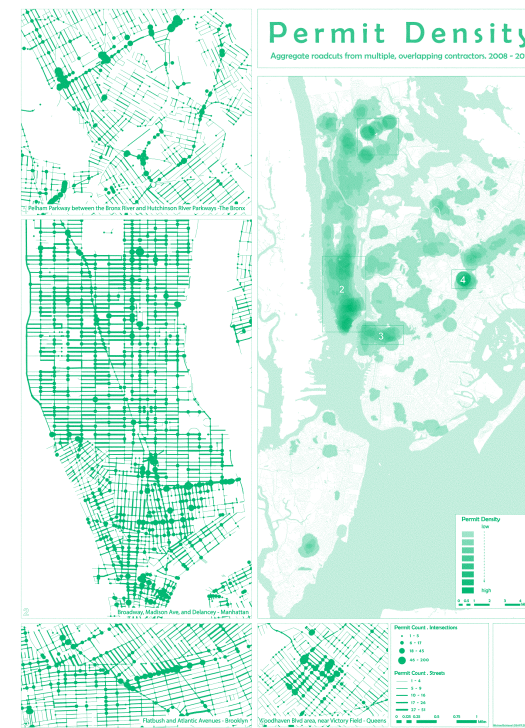
Michael Schissel, a graduate student working with the Spatial Information Design Lab, mapped the city’s utility road cut permit data from 2008 to 2012 to illustrate the intensity of utility cuts across the city over time, providing another lens for practitioners to consider policy, practice and design options based on intensity of road cut activity by

location. The data is visualized in two ways. The larger maps show the aggregate density of road cut permits issued over the available time range. The Permit Density map shows overlaid data for all permit types and recipients, while the Public/Private map filters the data to compare the distribution of permits received by government contract and with those received by private utility companies. The smaller, inset maps isolate areas of high intensity discovered through the density mapping. These enlarged areas visualize the data quantitatively for both street and intersection permit locations. They can also provide a visual sense of negative externalities that, with additional analyses, could be translated quantitatively into costs that are potentially avoidable with management and/or design interventions. Some of these avoidable costs, such as repeated roadway repairs and roadway reconstruction projects that cannot approach their technical useful lives, are financed at the municipal level by taxpayers. Other avoidable costs, such as repeated repairs to and expansion of private

Resulting Action: This series of analyses developed from an ongoing series of roadway-related research that continues in academic year 2103-2014. Originating from a life-cycle cost benefit analysis modeling project for sustainable roadway design and materials, these projects include broadening the scope to include a cross-system of which the roadway is an integral part as well as the public capital planning process. [End]

utility infrastructure (both of which require digging into and repairing the roadway) and protecting existing utility infrastructure during the city’s roadway reconstruction projects, are financed by many of the same

people or entities, but this time as utility ratepayers. The following infographic map along with the legal investigations provide the take-off point for a future action research set. [End]



Design: When Does It Begin and End?, March 14, 2013

The third symposium event was the second iteration of an action learning set focusing on design. The initial event, *Design: Just What the Heck Is It?*, held on October 17, 2012, explored the many meanings of design and included a case study project at the New York [\[→\]](#)

ACTION LEARNING SET

Multiple Investigations into Design

PROJECT ABSTRACT

***Measuring Client Satisfaction:
A Policy Project for the NYC
Department of Probation***

Town: NYC DOP
Gown: New School/Milano

The case study, described in the Symposium Synopsis above, of the repurposing by the New York City Department of Probation (DOP) of its waiting rooms into Resource Hubs in connection with its NeON program is one result of DOP's

practice of incorporating holistic evidence-based practices. Another piece of this holistic practice is the agency's adoption of a customer service orientation approach in providing its services. Evidence-based practice requires program evaluation, which is closely aligned with assessing satisfaction via the customer service model. In order to develop an evaluative feedback model for DOP to consider using with its clients, Priya Ananthanathan, Sara DeConde, [\[→\]](#)

[→] City Department of Probation (DOP) that was informed by a series of research projects that turned data into knowledge, eventually leading to the repurposing of DOP's waiting rooms into Resource Hubs in connection with its Neighborhood Opportunity Network (NeON) program. This case study began with design-inspired and design-based interventions in public policy analysis (at 30,000 feet) that ultimately resulted in changes in program policies, practices (at 1,000 feet) and physical sites (on the ground). The case study also noted the several impediments to implementing design changes at specific sites that were created by the city's systemic budget and procurement practices.

The participants discussed how design-based research methodologies and techniques turn data into knowledge in a cyclical process that can include policy recommendations, implementation and evaluation. Mapping social indicator data is an analytical methodology on its own, and can help inform other quantitative and qualitative social science methodologies. Resulting policy recommendations that require translation into physical space then tap into the traditional design-related disciplines of architecture, engineering and interior design. Service design, which focuses on the interplay between interior physical spaces and other forms of communication, facilitates associated reforms in service delivery, the traditional domain of program management analysis. The participants' expressed desire to

make service design capacity a part of public agencies' DNA and management tool-kit led to an "a-ha" moment. While the impediment posed by the capital-expense budget divide is not insignificant, the more immediate impediment was the lack of contracts for the array of high-quality design-related services that agencies could access quickly when design needs arise and expense funds at the agency-level are available. [End]

SYMPOSIUM SYNOPSIS

Looking Ahead to NYCxDesign 2014, May 21, 2013

The fifth symposium event was held during NYCxDesign 2013, the city's first "design week". At this event, three panels continued to explore the meanings of design. The first panel was an initial step to bring some of the engineering disciplines, as designers, into the design conversation. While the various engineering sub-disciplines express themselves "solving problems" it is apparent that in solving problems with respect to buildings and infrastructure, engineering is also designing. The second set of panelists discussed how the city's design-related academic institutions can support the design sector of the local economy, in particular, by focusing on pedagogical programming to integrate basic business and entrepreneurial skills with the design curriculum and connecting the design programs with [→]

Multiple Investigations into Design

[→] Claudie Mabry and Linnea McCalla (the Team) conducted a literature review related to customer survey design, response and validity in order to assess strengths and weaknesses of the various tools; conducted a series of field visits to various sites at DOP, some of which are part of the NeON program and some of which are not; conducted interviews with various criminal justice professionals at the agency and in other jurisdictions as well as professionals from various disciplines, including the design fields; and, developed a series of case study tools used outside the criminal justice field. While confidentiality requirements imposed by the criminal justice

system constrained the research as did the lack of a comparable jurisdiction and lack of academic consensus on evaluation tools, the Team developed several proposals and evaluated them against criteria to maximize client response rates, minimize agency time to analyze the response data and maximize the quality of feedback. The evaluation concluded the pull-text questionnaire, utilizing text messaging technology, was the optimal methodology, though the Team did raise an additional methodology of conducting focus groups to provide supplemental qualitative data and provide the agency with an opportunity to expand and learn from the evaluation. [End]

PROJECT ABSTRACT

Collab: Design & the City

Town: See note below
Gown: New School/Parsons

This design studio led by Katherine Howe, Lecturer, asked a mixed class of undergraduate and graduate students in graphic design, architecture, and digital design to learn about the context and processes of design specifically using New York City government programs as the context. Beginning by investigating six examples of current design programs that work well in the government context — Percent for Art, the design group at the New York City Department of Parks and Recreation, the New York City

Department of Transportation's Plaza program and Summer Streets program, the New York City Department of Design and Construction's Design and Construction Excellence program, and NYC&Co. — the class first identified and extracted common processes or principles, such as leadership, programmatic issues, implementation, changing institutional practices and institutionalizing a program. Based on this original research, the class developed a theory of conditions necessary for design to succeed within governmental agencies including a leadership mandate, a committed shepherd, participant input and celebration of success. Legally-mandated [→]

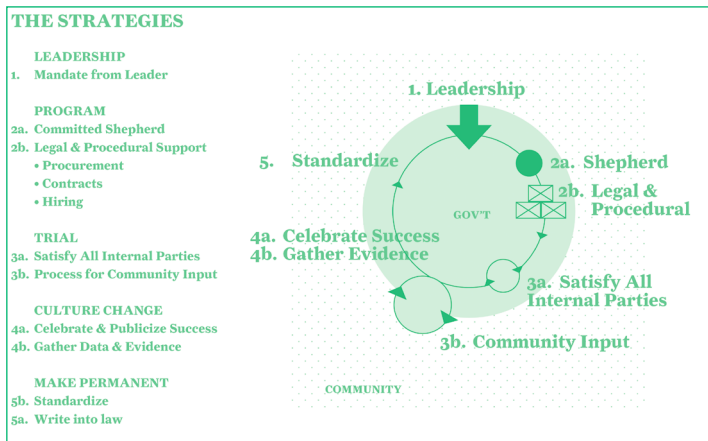
[→] New York's other economic sector businesses, developing city-wide academic partnerships. The event concluded with a panel discussion about how city agencies use design in their work, cataloging design resources within government and identifying challenges that lay ahead for the next administration. [End]

Resulting Action: Next year's NYCxDesign 2014 website will have a button for engineering; as of the date of this volume, several city-wide design-related requirements contract RFPs are under development; and in a joint studio class at Pratt Institute, Construction Management (CM) and Undergraduate Architecture (B Arch) students will collaborate on a project using various BIM tools, with the B Arch students producing a BIM model, conducting whole building analysis and coordinating and exchanging data with CM students, and the CM students performing constructability reviews, quantifying materials and providing cost estimates, reviewing logistics and simulating the assembly of the building with 4D tools. [End]

Multiple Investigations

[→] procedures emerged as a tool to support implementation as well as institutionalization. Using one of the six programs they had investigated as inspiration,

student teams then developed new design solutions to meet needs they had identified during the research phase. [End]



Planning Sustainable Neighborhoods: Anatomy of a Project— From District One to Microgrid, June 18, 2013

The last symposium event of the year focused on a project that began as a design intervention to explore ways people could reduce light waste. The design team sought research in the area of energy waste to inform its design intervention. Yet because electricity relates to [→]

ACTION LEARNING SET

Multiple Investigations into Creating Sustainable (and Now Resilient) Neighborhoods

PROJECT ABSTRACT

Rethinking the Grid

Town: ExpoTENTIAL, NYC DDC
Gown: Cornell/CRPP

Hewing to District One, the city's first electric utility, as the study area and conceptual symbol for the project, Vidhee Garg, Jacob McNally, Rebecca Parelman, Jiang Ren and Steven Wang (the Team) started with a visualization of energy-related data and quickly moved to researching the nature of the physical infrastructure that is at once

the local, regional and national electric power grid. The focus on electricity transmission infrastructure opened up the field of analysis, moving it far beyond the point at which a person flips the light switch on the wall—the focus of ExpoTENTIAL's light waste lab project which the research was aimed at supporting—to the complex systemic and regulatory processes that control it. The complex systems implicated in the sustainability agenda, such as the nation's energy system, create real [→]

[→]physical infrastructure systems beyond those elements present in the city, with federal and state regulatory reforms that separated energy generation from transmission, and a public utility regulatory apparatus operating at the state level, the two resulting projects necessarily expanded the scope of the research and generated potential solutions that were not practically actionable at the local level. Instead of supporting the design intervention as originally conceived, the

analyses required the design team to re-conceptualize the intervention completely.

The conversation explored issues of scale that often arise when implementing the sustainability agenda's "think globally, act locally" mandate. Since the objective of design is communication, design tends to focus on the end users of the information, who, in a civic entity, are people within various communities at various scales. This [→]

Multiple Investigations into Creating Sustainable (and Now Resilient) Neighborhoods

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[→]spatial, legal, financial and political barriers that frustrate local initiatives, yet the Team was able to identify options authorized in other jurisdictions to reduce energy use by changing incentives in the grid system that supplies energy to buildings within a local jurisdiction. The city's efforts have focused primarily on those local laws that regulate public and private buildings in order to reduce building energy use and waste and encourage conservation. While these efforts are on a city-wide scale, the Team suggested that they may be insufficient due to the nature of the larger system of which the local jurisdiction is only a part. Moreover, the Team suggested the prospective nature of intervention via building codes may render the costs to individual buildings higher than the respective benefits, even in the aggregate. Encouraging the creation of district-wide grids—also called distributed generation or microgrids—that permit greater overall reduction in carbon emissions than do regulations aimed at the building scale, however, requires government action at the higher state level because privately-owned electricity transmission is regulated at the state

level, not at the local level. The Team concluded that reducing carbon emissions locally not only required continuing local efforts aimed at the building level but also required focusing on making changes at the grid level within the jurisdiction, intervening at different scales and turning the focus to the larger scale infrastructure within and outside their boundaries. [End]

PROJECT ABSTRACT

Confronting the Challenges of Microgrid Development in Post-Hurricane Sandy New York City

Town: ExpoTENTIAL, NYC DDC
Gown: Cornell/CRPP

Jacob McNally, a member of the student team from the project abstracted above, continued to pursue the research path in a Masters of Urban Planning research paper. The effects of Super Storm Sandy, visible in real time during both projects, underscored the challenges facing the existing energy grid and its need for modernization to increase resiliency as well as contribute to the reduction of carbon emissions. Technological advances foreshadow the ability to generate greater reductions in carbon emissions at a larger

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scale with the incremental costs shared over a larger area and among more stakeholders than is possible for local jurisdictions acting alone and using existing limited legal tools. The regulatory decoupling of energy generation from transmission in conjunction with engineering and technology innovations improving aspects of energy generation at the local level are increasing the incidence of customer-sited energy production. The distributed generation (DG) model is the opposite of the centralized model that has long characterized the development of energy infrastructure and consists of an electric generation system powered by smaller sources removed from the centralized power distribution grid, often sited on the building owner's property. DG systems connect to the larger distribution grid from the "customer side of the meter" and can be powered from a variety of energy sources. With DG systems as the building blocks, microgrids integrate multiple distributed energy resources with a group of interconnected customers, operating in parallel or in isolation from the public grid, with potential to produce greater economies of scale and

benefits than are possible at the building DG scale as well as provide an intermediate scale element to help the centralized providers reduce waste and inefficiencies at the centralized level. Since, however, as McNally noted, microgrids require some connection to the existing larger public grid's distribution infrastructure network "backbone", it will be necessary to identify and address the complex issues of public utility regulation at the state level in order to develop the mid-range space of the microgrid as a policy solution to environmental sustainability and/or resiliency concerns. Working from a menu of ways for local government to influence broader energy outcomes, such as governing by leadership, authority, provision and enabling, McNally identified strategies for the city to consider in its approach to DG systems and microgrids within its jurisdiction, such as leveraging existing initiatives, improving agency coordination to address the interconnections between economic development, land use and energy use and working to expand the Solar Empowerment Zone program to include DG and microgrids. [End] [→]

[→] design focus on the end user can also support forward-looking participatory input gathering methods, but it is important to keep in mind the alignment of participatory action with the scale of the problem and related artifact acted on and the level or levels of government responsible for the problem and artifact. The ability of designers to engage people to interact with a level of government that is not responsible for solving the problem—or even able to solve the problem—creates a

disconnect and frustration. Designers can help explain how broader scale policies relate to or translate into more fine grained impacts and can help avoid inconsistencies among the various scales on an issue, but the sustainability agenda reveals complex intergovernmental spatial issues with different legal, finance and geographical systems perspectives. Government plays several roles in any issue area and there may be multiple levels of government involved as well, so that [→]

Multiple Investigations into Creating Sustainable (and Now Resilient) Neighborhoods

[→] PROJECT ABSTRACT

Green Affordable Housing in New York City: Past, Present and Future

Town: NYC DDC
Gown: CCNY/Sustainability

Shiri Amoray and Howard Coppari (the Team) utilized the case study methodology to explore the history of affordable housing in the city from 1971 to 1983 and the application of environmental sustainability principles and practices to recent affordable housing projects from 2010 to 2012 in order to provide an analytical foundation for future researchers and practitioners to research and develop ways to increase the production of sustainable and affordable urban housing. The Team reviewed the literature in order to provide a foundational survey of various government interventions in the private housing market to increase the production of housing that is affordable for a segment of the population and to provide a summary of contemporary environmental sustainability principles and practices. The first set of five case studies of affordable housing projects, which include various land use

density typologies, covered a time period that includes the “top down” slum clearance public housing model and the model in which community participation in the development process influenced the “top down” model to some extent. The second set explored various environmental sustainability features of affordable housing projects after the community participation model had matured. The Team also prepared a mock model in response to an architectural competition to illustrate planning and technical architectural/engineering issues encountered in developing sustainable affordable housing. [End]

PROJECT ABSTRACT

Improving Environmental Standards for Publicly Funded Construction

Town: NYC MOEC
Gown: New School/Milano

The modern environmental sustainability movement has inspired new laws and regulations aimed at reducing carbon gas emissions in order to slow or stop global warming. In urban centers, such as the city, the sustainability agenda has generated new laws and regulations aimed

at buildings because in an urban environment, the construction or renovation of buildings and their operations are the most significant generator of energy inefficiencies and carbon emissions. Moreover, propelled by the same sustainability agenda, building technology has evolved rapidly and is expected to continue to innovate and evolve, posing a practical problem for the regulator, that is, how to keep a particular set of laws or regulations, based on technology and scientific understanding at the time of adoption, current or “ahead of the curve” as both technology and science evolve. Using Local Law 84 of 2005 (LL 84/2005) as the case study to explore how local government, as both an owner of buildings and as regulator of all buildings within its jurisdiction, can stay ahead of the technology and science curve with respect to its regulations, Christianna Ambo-Jones, Maham Anwar, Michael Armstrong, Deborah Delgado, Micah Hunter and Alex Shaw (the Team) developed an analytical model for future regulatory proposals. The Team’s review of the intent and design of LL 84/2005 and relevant literature

and interviews with practitioners revealed several criteria against which future regulatory proposals could be evaluated—maximizing cost effectiveness, maximizing environmental impact, reducing non-financial obstacles to the law’s effectiveness and increasing its alignment with sustainability goals. On the issue of cost effectiveness, several studies indicate that for proposals involving buildings, the predictive value of cost analysis increases when the proposal design includes a focus on elements along the project spectrum from early planning and commissioning. [End]

PROJECT ABSTRACT

Smart City: Green City

Town: The Sallan Foundation, NYC DDC
Gown: Fordham/Law

The project undertaken by law students Alexander Zozos, Luis Calvo, YoonJee Kim and Yehuda Willner (the Team) examined, through various lenses, the challenge of keeping laws effective as well as cost-efficient after enactment. Over the last few years, many cities have enacted laws aimed at reducing carbon emissions by regulating buildings at [→]

[→] government's role in a particular issue area will determine the nature of the design approach it will support. [End]
Resulting Action: One type of action in systemic action research is providing a foundation for future research. As environmental sustainability and resiliency issues continue to unfold in real time, the articulation of issues, surveys of literature and analyses documented by projects investigating how to increase environmental sustainability and resiliency

Multiple Investigations into Creating Sustainable (and Now Resilient) Neighborhoods

[→] a time of evolving technology and science, in order to achieve environmental sustainability policy objectives. Many of these laws use the local building code as their site for action, and, in 2009, the city enacted a suite of four building code regulations. Working with various theories of law, including economic welfare theory and behavioral economics theory, the Team identified a menu of tools for future drafters to use to evaluate and possibly revise these laws as their effectiveness becomes clearer over time, in order to help make them more effective and efficient in achieving their stated objectives. Since this menu derives from the conceptual intersection of law and economics, future analyses based on data, some of which are being collected as a result of these laws, will be necessary to inform future legislators on the best ways to reform them. [End]

PROJECT ABSTRACT

What Would You Do If a Hurricane Was Coming—The Pre- and Post-Emergency Toolkit for the 21st Century

Town: NYC DDC
 Gown: NJIT/Industrial Design

In the aftermath of Superstorm Sandy, when the sustainability

agenda ran into nature and the focus immediately turned it into a resiliency agenda, an undergraduate industrial design studio class, taught by Brooks Atwood, used industrial design to help create resiliency within neighborhoods before and after a natural disaster. The students were tasked with using their industrial design skills to help develop innovative design solutions, forms and products in the form of prototype "emergency kits". These kits were intended to reflect a thoughtful understanding of the needs of people in their neighborhoods when extreme natural conditions strike, to enable them to prepare in advance and also to ameliorate the situation in the aftermath. The students were also asked to consider designing these emergency kits to be useful to the most vulnerable and permit them to improve their situation, with hope, dignity and a measure of independence or self-reliance, especially when the aftermath involves a stay in public shelters. The prototype emergency kits ranged widely. Some metaphorically brought the outdoors—represented by many forms borrowed from camping—indoors. One

at the neighborhood level and at greater infrastructure scales will serve as analytical resources-in-waiting. In addition, the symposium event, Policy, Meet Design, on October 10, 2013, continued to explore the issues raised during this symposium event, in particular focusing on the relationships between public policy programs and disciplines and design programs and disciplines, and also used the From District One to Microgrid project as a case study presentation. [End]

kit focused specifically on the needs of parent with infants in shelters. These innovative design ideas also used chemical reactions to make coffee in the absence of electricity and multi-purposed fabric for both sleeping and wearing. [End]

PROJECT ABSTRACT

Eco-District Housing: Infrastructure, Resilience and Public Space

Town: See note below
 Gown: NYIT/Architecture

This studio class, led by Jeffrey Raven, Associate Professor, and Andrew Heid, Adjunct Professor, asked students to use the idea of compact density to design mixed-used housing in an eco-district located in Red Hook, Brooklyn, as means to explore various aspects of integrated urban design and planning strategies for creating sustainable and resilient communities. The studio's focus permitted investigations of the relation of the compact community setting to now-standard sustainability criteria, such as reduced energy loads, reduced greenhouse gas emissions and enhanced civic life, as well as to evolving concerns about resiliency to

the impact of natural forces in high risk environmental hazard zones. The student projects were to take advantage of natural systems and integrate all components into a climate resilient public realm, with some consideration of costs and benefits. Ideas expressed in the final projects included combining barrier infrastructure with housing; restructuring the city's combined sewer and runoff water system within wetland areas to separate the grey water to return untreated to surrounding waters from dry sanitary waste that could be diverted to a cogeneration facility to capture its energy; and creating a new housing typology elevated above the new high water mark, leaving the older housing typology to be reclaimed by nature
Note: Past volumes of Building Ideas have abstracted projects that originated outside Town+Gown but nonetheless relate to existing research questions or projects. Since projects like this can provide the foundation for future research projects within Town+Gown, they are captured in Building Ideas. [End]

INTRODUCTION

An early inspiration of the Town+Gown program was city agencies' experience with construction costs that started ramping up significantly in 2005, abating only with the recession that took place in 2008. During that period, the city undertook various efforts to understand root causes of cost increases and reform its practices and policies to contain and/or reduce construction costs. The construction [→]

ACTION LEARNING SET

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Multiple Investigations into the Impact of Built Environment Practices

PROJECT ABSTRACT

Why Does It Cost So Much to Build in New York—Private Construction?

Town: NYC DDC
Gown: Brooklyn Law School
CUNY/Hunter College

Researcher Emily Anderson, fulfilling requirements for joint law and graduate urban planning degrees with an independent reading and writing project, conducted a qualitative research project, spanning both law and planning disciplines, to focus on the issue of private construction

costs in New York City. The quantitative methodology, appropriate for an issue area that is too complex for existing theories to sufficiently address, included a literature survey in both disciplines and interviews with local built environment participants, revealing a multiplicity of cost drivers, some of which are avoidable and others of which are not. Excluding certain drivers from the analysis, such as national economic conditions and land development processes, Anderson identified a series of [→]

[→] business cycle lags the general business cycle, but the cyclical nature of both means that research into the relation of root causes and effects during a particular trough or peak can be applied in advance 'of the next trough or peak. Over the years, several completed projects in Town+Gown have focused on the impact of policies and practices on

Multiple Investigations into the Impact of Built Environment Practices

[→] cost drivers embedded in state law as well as in local municipal law. She then identified a series of cost drivers that result from the city's dense urban environment—from construction logistics to the prevalence of shared structural walls between buildings—the relative weakness of construction manufacturing sector within the local economy and the relative strength of unionized construction labor within the city. Anderson suggested quantitative analysis of the identified drivers as a next step within Town+Gown. [End]

PROJECT ABSTRACT

Construction for a Livable City: A Preliminary Cost-Benefit Appraisal

Town: New York Building Congress, NYC DDC
Gown: New School/Milano

While increased regulation is often cited as a driver of increased construction costs, the New York Building Congress Foundation's Construction for a Livable City (CLC) program promotes voluntary adoption of a checklist covering elements of community-friendly site management—operations, environmental impact, image and design and community relations—as a cost-effective way for project owners and their contractors to fulfill their social

responsibility agenda and also increase public support for construction, which is part of and impacts the city's economy. In order to provide the Foundation with a roadmap to develop the appropriate formal cost-benefit model, Anna Alarid, a graduate student, developed a preliminary cost benefit analysis framework for self-regulation, using the CLC program as a case study. Alarid analyzed the types of cost-benefit models that corresponded to elements of CLC—corporate social responsibility models, highway construction and public outreach models, construction health and safety management models—that could provide elements for a model to evaluate CLC. With respect to foundational components of the model, Alarid suggested that the New York City Department of Design and Construction's community liaison practice for roadway projects could serve as a baseline case for the model and she identified issues to be resolved for the other components such as assessing stakeholders, costs and benefits. Alarid's analysis concluded with a roadmap to complete the remaining steps and identified remaining broader issues for consideration. [End]

construction processes and their related costs—below are abstracts of projects completed in the 2012-2013 academic year focusing on some aspect of this thematic project set. [End]

Resulting Action: One type of action in systemic action research is [→]

PROJECT ABSTRACT

Leasing Space in New York City: A Practical Guide for Technology Start-Ups

Town: NYC EDC
Gown: New York Law School

When a local government seeks to effect policy change in the built environment and a significant amount of the affected activity takes place in leased space, policy success depends to some extent on the ability of leases to accommodate, or not hinder, the desired change. The standard New York City commercial real estate lease articulates a long-term relationship between a lessor and a lessee, both of which are often businesses with different revenue needs, and reflects an archetypal power relationship between landlord and tenant, in which tenant-initiated deviations from standard allocation provisions tend to require the imposition of additional costs on the tenant. This archetypal dynamic can be a source of challenge to policy initiatives when a significant amount of the activity covered takes place in commercial buildings. In response to the city's several initiatives to foster the development of the technology sector of its local economy by increasing high-tech business creation and growth, a broader question emerged about what

changes to law and policy might be needed to facilitate the development of the tech industry in the city. Danielle Ash, Jeffrey Kahn, Laura Schnaidt and Kate Voran (the Team) focused on the standard commercial lease as an impediment to growth-stage technology companies that need to transition from incubator space to traditional office space, but find it difficult to negotiate affordable, short-term leases that accommodate growth and flexibility. The Team reviewed public policy goals and objectives, reviewed and abstracted relevant lease provisions, conducted interviews with real estate and technology sector stakeholders, and performed substantive legal review to develop a series of strategies to solve for particular lease issues that companies face during their start-up years. The Team developed a guide to lease negotiations, with suggested strategies and lease provisions, as a tool to support the broader policy objective by permitting growth-stage companies to design a lease that aligns better with, and is flexible and conducive to, their long-term business and financial planning needs and allows for the possibility of future growth. [End] [→]

[→] *providing a foundation for future research. Until the related economic, business and construction cycles coalesce to a point at which construction costs trend upward, the articulation of issues, surveys of literature and analyses documented by projects investigating the impacts of built environment practices will serve as analytical resources-in-waiting.* [End]

Multiple Investigations into the Impact of Built Environment Practices

[→] PROJECT ABSTRACT

Construction Lighting Study: East Campus Police Academy

Town: NYC DDC
Gown: Rensselaer Polytechnic Institute

Unlike in industrial production, where the products-in-the-making move through various assembly sites within the factory, in building production, the assembly crews and their work sites move through the emerging building. Sometimes referred to as a “parade of trades,”² assembly crews perform their specialty trade work, sometimes in different directions, as the floors of the building go up, creating the potential for congestion and impediments to access. The owner pays for both the costs of materials fixed in place to become the finished building and the costs of materials and other commodities for the temporary physical features that accompany the emerging building process that the contractor dismantles and hauls away at project completion. All temporary requirements to facilitate the assembly, from work trailers to the electricity and temporary lighting system fall within the contractor’s overhead and become part of what is known as “general requirements” of the construction contract. While the city requires its newly constructed buildings to

be environmentally sustainable, its general requirements are silent on that topic. As a first step to assessing the feasibility of applying environmental sustainability standards to general requirements, researchers conducted a comparative analysis of standard lighting technology and three alternative technologies on an active worksite, one technology to a floor, across several metrics such as initial installation and materials costs, payback period and energy savings, dismantling and disposal costs and compliance with federal workplace safety requirements. The researchers also generated qualitative data through site worker surveys. While the comparative results of the four lighting technologies suggest the potential for energy savings in the general requirements, next steps would include a focus on the nature of the construction process and the contractors’ business models before developing changes in practice and policy. [End]

PROJECT ABSTRACT

Reasons for Small Construction Firm Success or Failure

Town: NYC SBS, NYC DDC
Gown: Manhattan College/Business

Deena Sena, graduate student, and Janet Rovenpor, Professor of Management, used

a multi-method approach to collect and analyze data to begin to answer a broad question in the T+G research agenda—Future Workforce Needs and Development: What Are the Conditions for Construction Business Formation and Success? The researchers conducted a literature survey, interviews with construction practitioners and professionals, including an expert in the surety industry, and an exploratory analysis of the New York City Department of Design and Construction’s project database for the past 10 years. Sena and Rovenpor identified external and internal impediments that can act as barriers to small construction firm success, but limitations with the data set prevented the researchers to connect the data with the identified impediments. Sena and Rovenpor identified directions for future research with the data set based on insight from the interviews, including converting the data from a project-based perspective to firm-based one and investigating the appropriate measurements for firm capacity in addition to the number of contracts received. In addition, more research is needed on the issue of “bid shopping” and competition from out-of-market firms, as a small business issue, as well

as developing a series of analyses, with other available data, including data from a future survey instrument, to test some of the experiential observations gleaned from the interviews. [End]

INTRODUCTION

An early Town+Gown project, Transitioning into Lifecycle Cost Analysis, a collaboration among New York City Department of Transportation, New York City Department of Design and Construction and a New York University/Wagner School of Public Service capstone team (the baseline LCA project), developed “legs” within the program after the students graduated, forming the basis for a series of related research [→]

ACTION LEARNING SET

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Multiple Investigations into and near the Roadway: Cross Systems

PROJECT ABSTRACT

***Toward a Sustainable NYC
DOT Capital Project Appraisal
Process: Possible Challenges in
Adopting EPA-Recommended
Life Cycle Assessment***

Town: NYC DOT, NYC DDC, Port Authority
Gown: Manhattan College/Business

Patrick Jeffers, Assistant Professor, Accounting, Computer Information System and Law Department, identified, as a potential weakness in the baseline LCA project, its reliance on the Federal Highway

Administration's 1998 Life Cycle Cost Analysis in Pavement Design model, which was based on a traditional net present value approach, and suggested that the more recent federal Environmental Protection Agency's 2006 Life Cycle Assessment model would provide a better foundation to capture the environmental sustainability aspects of the city roadway. Jeffers conducted a survey of software programs developed and being developed in the private sector and at several universities and [→]

[→] projects and two symposium events, the first in February 2012 and the most recent in January 2013, as summarized earlier in this Volume 4. As the program's collective understanding of the roadway has evolved, the city's understanding of the roadway in the context of a

Multiple Investigations into and near the Roadway: Cross Systems

[→] research centers in response to the EPA's 2006 methodology and recommended a demonstration presentation of a particular program to permit project participants to evaluate the feasibility of using such type of program for capital planning purposes. Jeffers further identified sources of existing roadway-related data that might serve as proxies for data not collected by city agencies at present. The identification of two federal methodologies has been useful to the ongoing research efforts. [End]

PROJECT ABSTRACT

Case Study Investigations into Life Cycle Cost Benefit Analysis of Green Infrastructure Elements on Roadway Reconstruction Projects

Town: NYC DDC, NYC DOT
Gown: University of Buffalo/Urban Planning

Francisca Licona, a graduate student, initially worked at the New York City Department of Design and Construction as a summer intern in 2012 and expanded her summer project into an independent study project that delved into technical problems of assessing the life cycle costs and benefits of incremental investments in green infrastructure (GI) project elements added to the city's standard roadway reconstruction projects. In the first part of the project, Licona

developed a detailed analysis of initial construction costs for (i) bioswales, a GI design element, and (ii) permeable gutters, a GI material and design element, which would become the case study typologies in the second part of the project. Licona also conducted a comparative review of initial construction and operations and maintenance cost data from other localities. In the second part of the project, after performing a literature review, Licona added, to the baseline LCA model, elements from other models she identified, such as environmental sustainability metrics. Then, working with proxy life cycle cost data obtained from various agencies, Licona explored available data and related technical issues that public owners would likely encounter when using life cycle cost benefit models at a time when data gaps are common. This exploration provides a foundation for further analysis to develop methodologies to manage the introduction of relatively new and untested GI design and material elements, representing incremental increases in initial costs over the traditional designs and materials, during a period of changing perceptions, objectives and technologies. [End]

cross-system that involves its combined sewer and runoff water infrastructure has also evolved, expanding the scope of the investigations into the roadway to include investigations near the roadway. Below are abstracts of projects completed in the 2012-2013 academic year [→]

PROJECT ABSTRACT

Roadmap for Pervious Pavement in New York City: A Strategic Plan for the New York City Department of Transportation

Town: NYC DOT
Gown: Columbia/Earth Institute

The City's roadway system comprises approximately 34% of its total impervious surfaces, and increasing its permeability can contribute to increased water absorption and reductions in overflows of untreated combined storm water and sewage from the city's combined sewer and overflow system. Focusing on two priority watershed areas—Flushing Bay and Newtown Creek—where roadway reconstruction is planned, graduate students Edward Bosch, Rene Branza, Emily Briggs, Cathy Chang, Atelisika Iyalla, David Logsdon, Ryan Mienke, Michael Moomjy, O. Douglas Price and Serena Sinckler (the Team) developed a methodology for integrating permeable pavement materials and designs into the city's existing roadway reconstruction program that could be expanded citywide. After identifying the statutory and historical context for the city's current green infrastructure efforts, the Team performed a systematic literature review of green infrastructure theory, pervious

pavement materials and street design and construction techniques, while conducting a comparative analysis of pervious pavement programs elsewhere, producing a series of case studies from which to identify practices feasibly transferable to the city's roadway reconstruction program. The Team then worked with the New York City Department of Transportation to develop a set of site selection criteria suitable for the city's geographical, built environment and roadway condition considerations, which when downloaded to a geographic information system mapping tool, permitted the Team to suggest optimal locations for introduction of pervious pavement and develop an implementation plan to deploy the introduction of pervious materials into the city's roadway reconstruction program. The Team's implementation plan noted potential impacts from historical sub-street utility infrastructure practices and policies as well as the need to update the city's protocol for roadway maintenance protocols and practices as both technology and understanding of the roadway as a cross system continue to evolve to ensure the pervious pavement will function over the lifespan of the street design. The Team also created a cost-benefit model to generate conceptual [→]

[→] focusing on some aspect of this thematic project set. [End]

Resulting Action: One type of action in systemic action research is providing a foundation for future research. As environmental sustainability and resiliency

Multiple Investigations into and near the Roadway: Cross Systems

[→] cost and benefit estimates and permit a first order comparison of pervious pavement installations—gutter-strip, parking-lane and full-roadbed. A final gap analysis for introducing pervious pavement in order to contribute to the citywide 10 percent stormwater recapture goal by 2030, led to the Team’s phased tactical recommendations, which included an initial two-year phase of demonstration installations and monitoring of demonstration site data to provide a basis to develop standards. [End]

PROJECT ABSTRACT

Finding Funding in Water: Old and New Urban Parks as Green Stormwater Infrastructure

Town: See note below
Gown: Harvard/Kennedy

Marianna Koval, a graduate student in an independent reading course, sought to identify new sources of funding for construction and maintenance of urban parks and highlighted the \$100 billion already identified as needed to be spent by the federal Environmental Protection Agency to create and maintain green infrastructure to comply with the Clean Water Act’s water quality requirements, as a potential source from the city to leverage for parks purposes to the extent park improvements

reduce stormwater runoff. Structured as an action memo to park and stormwater managers, Koval conducted a “state-of-play” analysis, beginning with a literature survey to provide contextual background on the Clean Water Act, the water quality impacts of wet weather due to impervious surfaces over large urban areas with older combined sewer overflow infrastructure, and the recent policy developments related to green infrastructure. Koval then analyzed three federal regulatory programs that promote green infrastructure and noted the federal regulator’s recent attempt to encourage integrated planning at the local level, with green infrastructure as a critical component to increase compliance. A popular tool in use across the country, including New York City, combines a consent decree/fine format with a long-term combined sewer overflow control plan that involves a commitment to construct a combination of hard infrastructure and green infrastructure improvements, largely financed by water and sewer utility user fees with support from federal loan and grant programs. The physical properties of natural green infrastructure typologies match those of public park elements and suggest a cross-systems approach to financing green infrastructure,

issues continue to unfold in real time, the articulation of issues, surveys of literature and analyses documented by the now many projects investigating the impact of built environment practices and how to increase environmental sustainability and resiliency in the context of roadway [→]

Koval researched more than 100 cases across the United States in which green infrastructure had either been retrofitted into existing parks or consisted of a new park, suggesting a series of next steps to bring public parks into the green infrastructure planning and funding process, including continuing research and the creation of national guidelines with respect to parks.

Note: Past volumes of Building Ideas have abstracted projects that originated outside Town+Gown but nonetheless relate to existing research questions or projects. Since projects like this can provide the foundation for future research projects within Town+Gown, they are captured in Building Ideas. [End]

PROJECT ABSTRACT

The Performance of Green Infrastructure under Extreme Climate Conditions: A Focus on the Impacts of Sandy and Irene on the Nashville GreenStreet

Town: NYC DPR
Gown: Drexel/Engineering

Franco Montalto, Associate Professor, Department of Civil, Architectural and Environmental Engineering, conducted a monitored performance evaluation of stormwater capture at a case study stormwater greenstreet site, in connection with the

Consortium for Climate Risk in the Urban Northeast program. The site was constructed in Fall 2010 by New York City Department of Parks and Recreation’s Green Infrastructure Unit, which constructs stormwater greenstreets and bioswales in the city’s right-of-way to redirect stormwater into green-space and reduce the quantity of runoff in the city’s sewer system. The case study site consisted of two separate planting beds, each receiving street and sidewalk runoff through separate curb-cuts. The monitoring system put in place at the case study site consisted of an onsite climate station, a flume to measure flow through the primary inlet, a shallow well to measure ponding depth and overflow from the site to the sewer, and soil moisture sensors. The timing of the monitoring project permitted evaluation of the site’s performance during the two most recent extreme weather events in the area—Hurricane Irene in August 2011 and Superstorm Sandy in October 2012. Monitoring during these two extreme weather events provided evidence of significant capture within the stormwater greenstreet and minor overflow. This evidence suggests the effectiveness of stormwater greenstreets to manage runoff both in typical wet weather as [→]

[→] *policy and practices will serve as analytical resources for several related projects still underway, providing an opportunity for a symposium event to collectively explore all the roadway-related research and identify opportunities for broader scale changes in policy and practice.* [End]

Multiple Investigations into and near the Roadway: Cross Systems

[→] well as in extreme climate conditions. [End]

PROJECT ABSTRACT

Hydrologic and Hydraulic Modeling and Analysis of New York City Green Infrastructure

Town: NYC DPR
Gown: Cooper Union/Nerken

Jacob Presky, a graduate student, created hydrologic and hydraulic models to assess the performance of current green infrastructure designs in use at three sites across the city that utilize bioretention methodologies at a site to reduce stormwater runoff. The first model accounted for hydraulics and interception, the second was a stormwater management model that did not account for hydraulics or interception and the third model behaved similar to the second model but accounted for hydraulics, in part, to see how sensitive the results are to hydraulics. The evaluations revealed opportunities to increase stormwater capture and internal storage capacity. [End]

PROJECT ABSTRACT

Hydrological Greenroof Modeling Program Using Water Balance Methods Applied to the Analysis and Design of a Greenroof

Town: NYC DDC
Gown: Cooper Union/Nerken

Feliks Leybovich, a graduate student, developed an Excel-based program to model the impacts of a proposed greenroof design project by inputting certain elements of the proposed greenroof design, such as soil type, soil depth, retention mat layers, vegetation type, and historical weather data, in order to calculate projected runoff, interception, and soil retention values as well as an average percentage of precipitation diverted from the sewer (the Hydrological Greenroof Modeling Program). Leybovich imported historical weather data from four time periods as well as weather data collected from the proposed greenroof site prior to the construction of the greenroof project. The case study design application for the Hydrological Greenroof Modeling Program was a greenroof on the recently renovated roof of multifamily housing facility owned and operated by a non-profit organization located near Cooper Union. The Hydrological Greenroof Modeling Program calculated interception capability of the case study project by using the MORECS 2.0 leaf area index calculated interception values for grass and will calculate actual runoff by means of a 1-inch Parshall Flume and by empirical methods of subtracting the calculated interception

and retention values from the precipitation. Cooper Union personnel will monitor the actual performance of the completed greenroof project to assess the predictive power of Hydrological Greenroof Modeling Program, with a data logger in use on the site and other equipment to be installed on the completed project to measure actual precipitation, evapotranspiration, water balance calculations and moisture content of the soil. [End]

Across the spectrum of public uses, there is always the potential for a mismatch over time between long-lived fixed capital assets and the demographic changes in populations that they were intended to serve as well as general changes in demand for such services. Demographic forecasting techniques are of limited predictive value during a building's entire lifespan. Public owners may find it difficult [→]

Multiple Investigations into the Mismatch between Capital Assets and Services Need: Co-Location of Compatible Services

[PROJECT ABSTRACTS](#)

Sensory Interiors Manual

Town: NYC DDC
Gown: Pratt Institute

Deanna Demers, a undergraduate student in Interior Design, used the public school setting as a case study for a multi-sensory design approach to make navigation within the interior of a building more independently accessible to the visually impaired while increasing social engagement among all occupants. For her thesis project,

Demers developed a design manual that addresses common conditions in existing schools to create a dynamic learning environment that calls upon all the senses to communicate interior conditions to the occupants. The deliberate choice of the manual format to address orientation and mobility (O+M) tasks is intended to compensate for limitations posed by local building codes using American Disability Act (ADA) provisions that function as default standards in designing public spaces. While the [→]

[→] to change policies or practices quickly to meet changing demographics and needs, especially in view of the practice of over-building public assets to assure they last “forever” in the face of historically insufficient maintenance after completion. This mismatch is further complicated in a highly built urban environment with little available land as a general matter and even less for public projects. Under such circumstances, currently underutilized public assets of many kinds might be considered as resources for future planned and/or unanticipated demand. This topic has been the subject of two Town+Gown projects: one recommended developing plans for multiple compatible uses within underutilized structures, the other explored how two agencies might co-locate services within under-utilized structures. The idea that public structures, such as school buildings, can be shared productively by multiple human services agencies and groups

providing social, educational, cultural and health services has been discussed since the early twentieth century. Below are abstracts of projects completed in the 2012-2013 academic year focusing on some aspect of this thematic project set. [End]

Resulting Action: One type of action in systemic action research is providing a foundation for future research. As the mismatch between assets and service demand continues to evolve in the context of limited resources and environmental sustainability, the various explorations of aspects of this thematic project set will serve as analytical resources for a possible symposium event to collectively assess avenues for future research and identify opportunities for broader scale changes in policy and practice. [End]

Mismatch between Capital Assets and Services Need: Co-Location of Compatible Services

[→] ADA requirements adequately address wheelchair accessibility issues, they fall short in equally addressing the needs of visually impaired people in those same spaces. The design manual focuses on using a fuller array of human senses and design standards beyond the standard use of braille, which is often inadequate, to support shorelining and trailing techniques used by visually impaired people. The manual does this by identifying integrated sets of initial rules to apply throughout a building for the categories of navigation, social zones and interaction, in addition to suggesting approaches to signage, material palette, lighting and hardware to support the O+M ability of visually impaired people—students, teachers and visitors—in schools. [End]

PROJECT ABSTRACT

Impediments to Making Public Schools a Hub for Health Care and Social Services

Town: NYC DDC
Gown : Brooklyn Law School

Britt Stern, a law student, responded to a hypothetical fact pattern that used the New York Education Reform Commission’s recommendation that school districts “[r]estructure schools by integrating social, health and other services through community schools to improve student performance”³ as a directive to determine the practicality of collocating human services in school buildings by identifying all state and local statutory restrictions and conditions governing the physical spaces where publicly-funded social services are delivered. The hypothetical chose New York City as the case study locality because of the likelihood that it has the most detailed set of local laws covering the facilities where social services are delivered and thus

the highest level of regulatory complexity as an impediment to co-location. Stern analyzed state and local law for four typologies—schools, health clinics, day care and foster care—generating four detailed charts with applicable state and local law provisions for each typology. Stern found that, for the most part, New York State law authorizes state and local agencies to regulate human service facilities, leaving the detailed specifics for building and construction requirements to rules promulgated by such agencies subject only to minimum legislated standards of health and safety. Thus, Stern noted, as far as co-location is concerned, such finding is a positive one due to the substantial level of elasticity built into state laws to allow local governments to reform their local laws to meet state requirements and increase co-location of compatible human services at underutilized public school facilities. [End]

3. New York Education Reform Commission, Putting Students First, pp. 14, 42-43 (see <http://www.governor.ny.gov/assets/documents/education-reform-commission-report.pdf>).

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